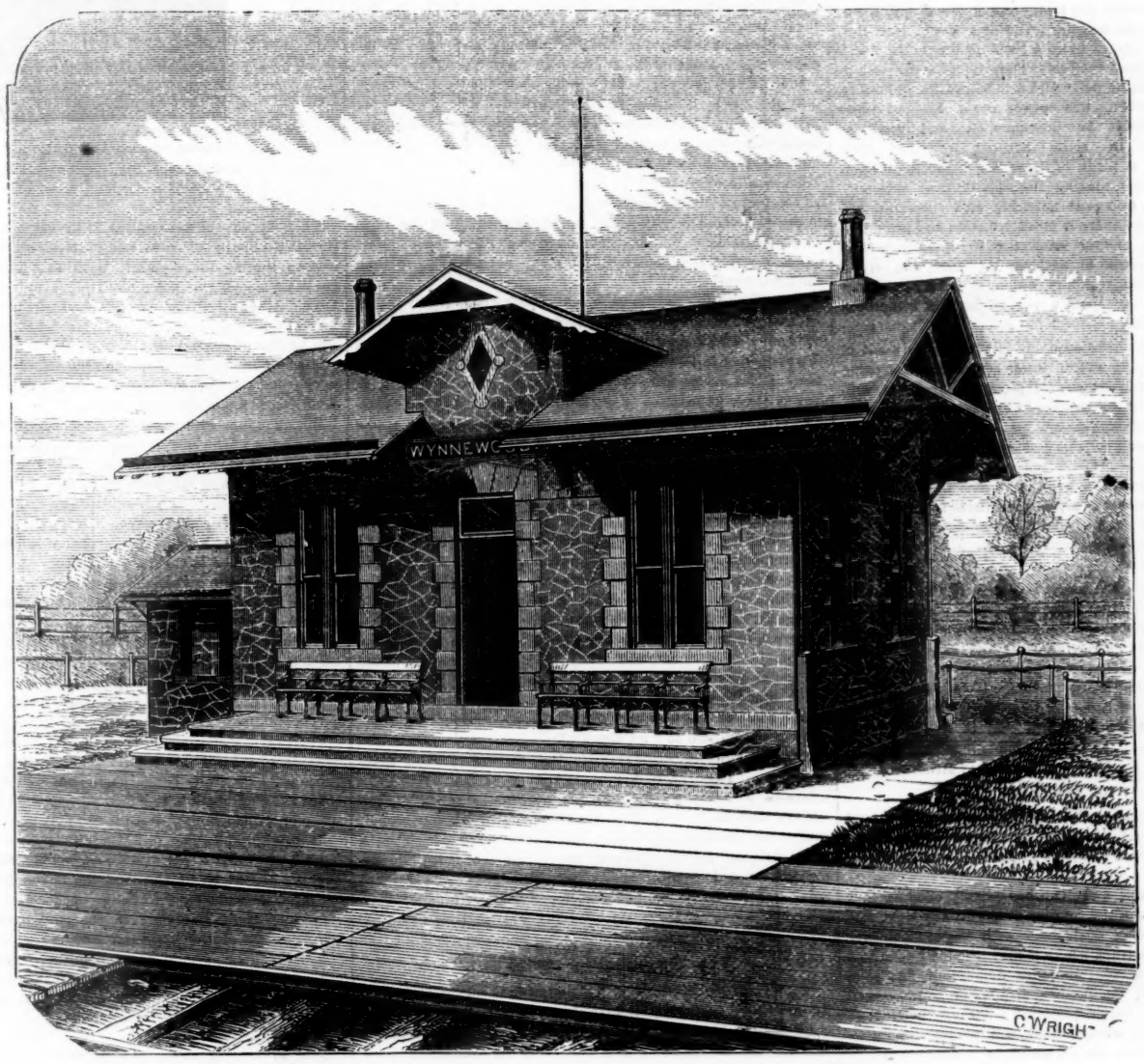
RAILROAD GAZETTE

SATURDAY, JANUARY 25, 1873.

Wynnewood Passenger Station, Pennsylvania Railroad.

This station was erected in 1870, at a point on the line of the Pennsylvania Railroad about 6½ miles from Philadelphia, for the accommodation of a local business consisting principally of families who have their country seats in the neighborhood. The walls are constructed of irregular rubble masonry in Fairmount gneiss stone, with dark pointing, the door and window dressings being Ohio sandstone and green serpentine. The outside woodwork is stained and grained in oil to imitate oak, and the roof is covered with slate in three colors. The platforms around the building are of stone flagging.

The architects were Mr. Joseph M. Wilson, C. E., and Mr. F. G. Thorn, and the structure was erected by the company. The actual cost for the building proper, not including grading and paving, amounted to $6,219.33. Beautiful suburban towns are so often deformed by an ugly station—probably the one building most generally used by the inhabitants and the first to meet the eye of the visitor and give him an impression of the place—that it is pleasant to see so successful an attempt to make such a building beautiful as well as convenient.



WYNNEWOOD PASSENGER STATION, PENNSYLVANIA RAILROAD.

Whiskey in the Cab.

The Altoona (Pa.) *Tribune* says:

"A few nights since the locomotive of a train on the Pennsylvania Railroad was run between Pittsburgh and Altoona by an engineer who had, unknowingly to the conductor, become considerably intoxicated in the former city. At times, at the most dangerous places, the man put the engine to its utmost test—forty-five and fifty miles an hour. But whenever he saw a red light he reversed the locomotive, and brought into operation the patent air-brake. The stoppages from Pittsburgh to Altoona on this account were very many, and the train was several hours late on arriving at the latter place. The peculiar movements of the train greatly excited the passengers and filled them with painful amazement. The conductor had become informed of the engineer's condition, but he could find no one to whom he could entrust the responsibility of running the train. He studiously kept his secret from the passengers, lest its divulgement would fill them with terror. Notwithstanding the dangerous hands in which probably a hundred lives had been placed, the train reached the end of the engineer's run with safety. It is needless to add that the drunken employee of the company was promptly discharged. He had previously been considered one of the best and most reliable engineers—as he was one of the oldest—on the road. On the day of the accident, unfortunately, he fell in with a party of friends, and drank an inordinate quantity of liquor."

Contributions.

Changing a Curve for Different Tangents.

DALLAS, Texas, December 19, 1872.

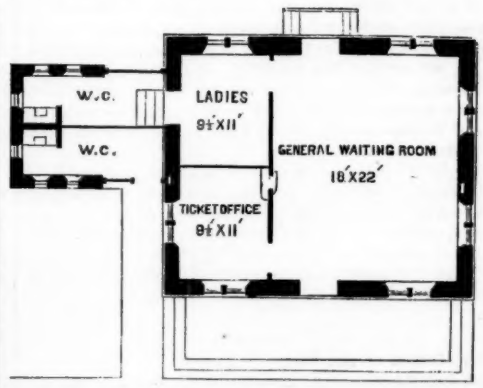
TO THE EDITOR OF THE RAILROAD GAZETTE:

In yours of December 7 is a curve problem proposed by "R. O. B.," of Albany, N. Y., dated November 26, 1872, to which I send the following solution, not original with me, but picked up some years ago in *Van Nostrand's*. *Refer to his drawing.*

$$\frac{F D + - [F D^2 + F G^2 - 2 R (F G)]^{\frac{1}{2}}}{(2 R - F G)} = \text{tang. } \tfrac{1}{2} D R E,$$ corresponding with the proposed extension.

The double sign indicates that two different tangents from the same curve may pass through the given point.

In the RAILROAD GAZETTE, of June 24, 1871, is a solution for a similar problem, by H. W. Lewis, Locating Engineer of the Kansas City, St. Joseph & Council Bluffs Railroad. And in a subsequent paper is another solution for same, by Col. Samuel



W. Mifflin, of Columbia, Penn., a distinguished authority on railroad curves. While in Henck's "Handbook," page 59, problem 80, fig. 30, is still another. W. M. J.

Calculating Areas of Cross Sections.

PHILADELPHIA, January 15, 1873.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the GAZETTE for December 21, "D. T.," in criticising "Hoosier's" paper No. 7, on Field Engineering, gives a formula for calculating cross-section areas of excavation or embankment.

$$(2 S C + W) \times \frac{L+R}{4} + C \times \frac{W}{2} = \text{area},$$

which may be reduced to a shorter form and give a rule more easily remembered.

$$(2 S C + W) \frac{L+R}{4} + C \times \frac{W}{4} = \frac{C}{2} S (L+R) + \frac{L + 2 C + R}{4} \times W$$

$$= \frac{C}{2} \lfloor W + S(L+R) + \frac{W}{4} (L+R) = \text{area}.$$

In the last formula it will be seen that $W + S(L+R) =$ the sum of the right and left distances out; from which we get the following rule for calculating areas:

To the product of one-fourth the width of road-bed by the sum of the side cuts or fills, add the product of one-half the center cut or fill by the sum of the side distances. W. L.

In the solution given by Mr. Conway R. Howard, published January 4, the statement was printed that where the given point falls outside of the tangent, "the formula is correct to within half a minute when $\frac{e}{d} = 0.15$." Mr. Howard writes to correct this, giving instead, "when it falls outside the formula is correct to within half a minute, *up to a radius* of 2,000 feet, when," etc.

Temporary Buildings—Hints for the Season—Treatment of Employees.

It is frequently a matter of economy to erect temporary buildings on new roads, such as water tanks, engine houses and the like, and this is practiced on most lines in this country to a greater or less extent—most generally the former. Some chief engineers seem to have a weakness for shammy, ill-looking temporary structures, and not only will they erect them where their use will be required for a brief period only, but they may be found in many places where it is intended at some future time to build a permanent structure. There are instances when it is difficult or perhaps impossible to obtain the necessary material for a permanent job when it is wanted, and a temporary affair becomes a necessity. But this necessity is usually the result of bad management. It is not a difficult affair for a chief engineer to determine at what time and place certain materials and appliances will be needed, and he can have them on hand in time to have the work thoroughly and substantially done. There are those, however, who have charge of the construction of new roads who never make any provision for anything until the moment it is needed. Then comes bustle and confusion. Something is scrambled together for material, and third-class workmen are set to using it, for no competent men have been engaged. If a water-tank is the work in hand, a rickety frame is sur-

mounted by a leaky tank; some pipes and a pump are tinkered up, and a wretched affair is botched up as a water pipe, and in filling the tender as much water falls to the ground as goes into the tender. The pounding of the valve in closing shakes the entire structure (if it may be called one), and timid men get out of the way. Two or perhaps four men stand on a couple of icy planks, considerably above *terra firma*, in an open frame exposed to rough weather, and further drenched from the miniature cataracts from overhead, which greatly increases their labor and weakens their admiration for chief engineers and faith in their management.

Now it is not a very expensive job to build a water-tank of the kind just mentioned, and it would not ruin any railroad company to demolish it at some future time and build a substantial one in its place. But this is usually postponed so far into the future that it becomes an expensive affair after all. The ingenuity of all who have to do with the operation of the tank and its appurtenances is taxed to devise ways and means of preventing the cause of the ceaseless music of the numberless tiny waterfalls which are played with by the gentle breezes, and would inspire the poet; but the men of the pump fail to be enchanted by "the sound of many waters."

The pipes connected with the pump are exposed and freeze up (or the water in them) and the locomotive goeth away dry. Or, if there should happen to be a little in the tank, much ice must be cut away from the joint before the pipe can be lowered to the tender, causing delay and demoralization generally, and in railroad operations this means *cash*. Suction pipes and force pipes must be disconnected and reset so that they may be in some manner protected from frost, and an effort is made to cover the entire institution, which is covered with ice, making the operation at once dangerous and doubtful. Constant patching and tinkering are the order of the day, and there is much vexation and profanity. There is scarcely any greater hindrance to operations than the failure of a water-tank to perform its office, and one of those seemingly inexpensive affairs will in a short time draw dimes enough from the company's till to pay for something substantial and reliable.

Another matter of doubtful economy is the employment of muscular power for raising water. Some companies are using Captain Erricson's caloric engines for pumping for tanks, supplying a large number of locomotives at an expense of 20 cents per day, with no fears of explosions. And there are some windmills which are furnishing reliable power for hundreds of tanks at a trifling cost, and the little steam pumps are doing good service at a cost of a few dimes per day all over the country.

But the chief engineer will argue that these are too expensive, and the company cannot afford them, or that they cost too much to set up in a place where their use will be required but a few months at most.

By reference to the advertising columns of the RAILROAD GAZETTE it will be seen that there are several manufacturers who make a specialty of furnishing to railroad companies all the necessary appliances for raising water and delivering it to the tenders, which can be removed and set up in other localities when desired without injury or loss. It is usual for all kinds of temporary structures to be forced to duty much longer than was at first intended, and that is frequently the cause of disaster. Indeed, there are some roads that are constantly in trouble from the failure of temporary structures.

HINTS FOR THE SEASON.

The season is now at hand when railroad operatives should be prepared for the usual variety of mishaps, or rather prepared to avert that class of disasters so prevalent in the winter months.

Thaws are likely to melt away the heavy body of snow now covering a large portion of the country at almost any time, and cuttings and ditches being obstructed with snow, water will work its way on to the track where it may become frozen to a height above the rail sufficient to cause derailment. As soon as snow begins to melt, the ditches and water courses need close attention, and the partially melted snow or "porridge" kept in motion with the current. This will prevent an overflow in case of a sudden freeze, which is almost certain to occur in the midst of a thaw at this season of the year. A little attention to this matter may save many lives and much property.

Blinding snow-storms are also the order of the day, and a little extra vigilance in running trains may prevent mischief of a first-class order. The chief danger in case of these storms is case of a disabled or "stalled" train, neglecting to send signals far enough in either direction to prevent collisions. A flag can only be seen a short distance, and frequently not at all in one of those furious snow-storms, and some of the "torpedoes" may be used to advantage. Time-cards should be closely studied, not forgetting to look for the sudden appearance of a train from either direction.

ILL TREATMENT OF EMPLOYEES.

There has been much complaint of late, both at home and abroad, in regard to the ill treatment and overworking of railroad operatives, and it seems that in many instances these complaints are well founded. In this country, however, overwork is not so much a cause of complaint as is the petty abuse employees receive at the hands of officers. It is obviously an unwise policy for any railroad company to require any employee to do duty when he is already overworked and in need of the rest which nature demands. Railroad officers require a strict observance of rules and a faithful performance of all the duties assigned to their servants, and this they have a right to demand; but the hours of duty should not be too long drawn out.

There is a limit to human endurance, and when an operative has been on duty until he is fatigued, and is in want of rest and sleep, it is unsafe to tax him further, as the consequences may be serious. Some distressing calamities have resulted from requiring engineers and others to operate for hours after they should have been at rest. Important signals are likely to pass unnoticed, or, if noticed, are forgotten; and they have but a vague idea of what is going on. When men holding responsible positions are required to labor more hours than they can endure without excessive fatigue, their responsibility should cease. It is not unfrequently the case, however, that men are kept at their post until so exhausted as to be incapable of vigorous action, and are insulted by their superiors, by whom they are charged with stupidity and inattention to duties. If their long-continued fatigue, want of sleep and nourishment should result in sickness, their pay stops from their last hours of service, and when they are able to resume their labor, they are informed that "We have another man in your place." Like the beast of burden, he is cast aside when he can do no more, and, when he applies for the pittance due him for past services, he is treated in a manner akin to contempt and coldly informed that he must "call again." It seems to be the idea of some railroad officers that so long as their employees will submit to such usage, it is all right; or that, if they accept the situation, they are satisfied with it and deserve no better treatment. They should bear in mind, however, that these men submit to this ill usage from necessity, and they should also remember that labor grudgingly performed is but ill performed, and that kind of labor or service is not profitable.

If twelve hours a day is the regular time for a man to be on duty, he will work that number of hours with a good grace and with care and diligence; but if he is required to serve eighteen hours without extra compensation, the last six the work is performed in a careless manner, regardless of consequences. Thus, a railroad company practicing this extortion may have an efficient and trusty corps of employees during twelve hours in the day, and a very "shaky," lot the remainder of the time. And although the company does not expect this extra six hours to cost it anything, it has been known to have cost more than the other twelve.

There is another narrow and unwise policy pursued by rather too many officers, that of going about with snarls and frowns, with not a kind look or word for any one, unless it should be their superior in power: and power is everything with them. They storm about among subordinates, who tremble with fear at their approach. Although they have served their master with fidelity, they expect a dismissal, for he "lets a man go" occasionally, merely to show his authority. He orders this and that (whether right or wrong), for the same reason, and he imagines himself monarch of all he surveys. He will discharge the best man in the employ, just to show his power and intimidate others.

He imagines he can have no control except through fear of his tremendous power. No one dare approach him with a request or suggestion, and he treats every one under his authority with a coolness that is painful to behold. He is active and energetic, and generally manages to throw everything into disorder wherever he goes; and he prides himself on his sagacity and good management, and really believes the company could not get along without him. Poor deluded being! He does not know that through his meanness and abusiveness he has driven some of the best men from the road, and that the company would do well to "let him go."

Happily, however, managers are fast rooting out this class of officers. They have discovered that it is greatly to their interests to secure a feeling of confidence and respect between officers and employees. Duties are then faithfully performed, everything goes on smoothly, and every employee takes a lively interest in the affairs of the company, and may be depended upon in case of emergency. Incivility and abuse of subordinates are evidence of a weak and shallow mind.

WM. S. HUNTINGTON.

The Question for Scientists.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In accordance with a previous proposition, I would respectfully submit the following as a solution of the problem presented through your columns for the consideration of scientists.

Without, however, supposing an engineer or roadmaster would allow a practice inconsistent with the most ordinary and commonplace of the rules applicable to such a case as your correspondent endeavors to prove, in your impression of January 11, not denying the possibility of its being one of the conditions, as well as the largest end of the tie being laid in one direction another condition; but by a simple reference to the laws of mechanical force, which leads to the conclusion that the western rail is acted upon with greater energy than the eastern, by the passage of fast trains, which will on their traject to the south, in consequence of the earth's daily motion, fall back on a line perpendicular to the direction of the train, and parallel with that of the earth's surface at their intersection, influenced by the electric fluid which tends to sway a train to the "right," augmenting the force already applied in the above direction, and diminishing or counterbalancing it on its return trip.

S. H. F.

TO THE EDITOR OF THE RAILROAD GAZETTE:

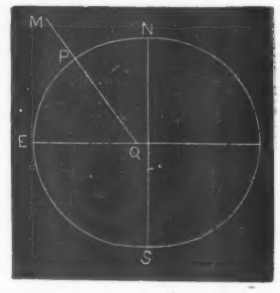
Although the answer of James T. Clark to the question "For Scientists," as published in your issue of January 11, is probably the true answer, if it shall be found, as he suggests, that the east side of the track of the road alluded to is the "line-side," still, on the other hand, admitting the facts in the case, if the west side shall be found to be the "line-side," then some other cause for the phenomenon must be found. I therefore submit the following observations as containing the true explanation, provided Mr. Clark's explanation is not satisfactory, and provided it is found that in the road under consideration the grade inclines to the south, so that trains run decidedly faster when going south than when going north.

The following proposition is theoretically demonstrable, and has been practically verified, viz.:

All bodies that have a *relative* motion on the earth's surface, if at any considerable distance north of the equator, and if unrestrained, *will deviate to the right;* and if south of the equator, to the left. The cause of such deviation, it is readily seen, lies in the rotation of the earth on its axis.

The fact that objects moving north or south, in northern latitudes, *deviate* to the *right* has long been recognized, and the cause has been correctly referred to their varying distance from the earth's axis.

The cause of the deviation when the object is moving east or west is not, at first view, so obvious, but will be evident from the following considerations:



Let *N S E P* represent a vertical section of the earth through the point *P*, and through the North and South poles, *N* and *S*, and let *M Q* represent a perpendicular to the earth's surface at *P*.

Then, because of the rotation of the earth about its axis, *N S*, it cannot remain spherical, and particles about the poles will be carried toward the equator, until the *greater* attraction of particles about the poles multiplied by their *less* centrifugal force shall equal the *less* attraction of particles about the equator multiplied by their *greater* centrifugal force, and its shape will be that of a spheroid.

Hence we infer that if the motion of the earth on its axis were *increased*, the particles at *P* would flow towards *E*, and if *diminished* they would flow towards *N*.

But an object on the surface of the earth, in north latitude and moving to the *east*, is precisely in the same absolute condition as if it were quiescent with respect to the earth's surface, and the rotation of the earth on its axis were *increased* so as to give the object the same absolute motion. Hence the object, if at *P*, would deviate towards *E*, or to the *right*.

In like manner it may be shown that if the object move to the *west* it will be in the same absolute condition as if it remained quiescent, and the motion of the earth on its axis were *retarded*, in which case it has been shown that the object would move from *P* towards *N*, or again to the *right*.

Having established the proposition that all bodies in north latitude which are in motion relative to the surface of the earth deviate to the right, it is easy to show that the deviation in every case depends upon the velocity with which the body moves and upon its distance from the equator.

I will assume that the road alluded to in the question "For Scientists" is located in Lat. 41 deg. N., and runs due north and south; its grade being such that the average speed of trains running north is 20 miles per hour, while the average speed of trains running south is 40 miles per hour.

In running one mile in latitude 41 deg., the change of distance from the earth's axis would be .66 mile = 3,484 feet, or, allowing 84 feet to be the declivity in the grade to the south per mile, we have, for the change of distance from the earth's axis, 3,400 feet. Therefore, in the road under consideration, the *difference* of the eastward motion, in *one minute*, of two points which are a mile apart, resulting from the earth's motion on its axis, is (because the earth makes one complete revolution on its axis in 23 hours 56 minutes, or 1,436 minutes),

$$\frac{3400 \times 2 \times 3.1416}{1436} = 7\tfrac{1}{2} \text{ feet.}$$

Now, in running north, we suppose the train to run a mile in three minutes; consequently the pressure upon the eastern rail, resulting from the rotation of the earth on its axis, is equivalent to a force that would communicate to the train a motion of 7½ feet in three minutes, or 2½ feet per minute. But in running south, we have supposed the velocity of the train to be 40 miles per hour, or one mile in a minute and a half. Consequently, while running south the lateral pressure upon the western rail would be equivalent to a force that would communicate to the train a motion of 7½ feet in a minute and a half, or 5 feet per minute.

Therefore, the *excess* of force acting laterally upon the western rail, in a road running north and south, and on which the velocity of trains running north is 20 miles per hour and the velocity of trains running south 40 miles per hour, is equivalent to a force sufficient to communicate to the train a motion of 2½ feet in one minute.*

And it may be affirmed, in general, that, on all railroads, when the average velocity run by trains in one direction is greater than the average velocity of trains of equal weight run in the opposite direction, there will always be an excess of pressure, in equal times, on the *right-hand* rail, if we face in the direction in which the velocity of trains is the greatest.

F. E. HENDRICKS.

DES MOINES, Iowa, January 15, 1873.

* This is true only when referred to equal periods of time. If the trains that run in both directions are of equal weight, the *total* lateral pressure upon the eastern and upon the western rail will, obviously, be equal. But because in a given brief period of time the lateral force is twice as great on the western rail, in the case under consideration, as it is in an equal period of time on the eastern rail, it is believed that this difference may in some instances be made manifest by the "creeping" of the rails.

Washington Railroad Notes.

WASHINGTON, January 22, 1873.

TO THE EDITOR OF THE RAILROAD GAZETTE:

THE FINANCIAL FUTURE OF THE PACIFIC RAILROADS.

Leland Stanford, President of the Central Pacific Railroad Company, who is now here advocating the Goat Island scheme, has recently made some very significant admissions relative to the Pacific railroads. Upon being closely questioned, he plainly intimated that the government, which is the holder of the second mortgage, will do well to look after its interests in those roads, if it does not desire the roads, with all their appendages, to fall into the hands of the holders of the first-mortgage bonds. The inference plainly is that these gigantic undertakings are in such condition that they may be unable to meet their interest obligations, in which event the natural legal consequences must follow.

The government has begun to "look after its interests" through the *Credit Mobilier* Committee Number 2, known as the Wilson Investigating Committee. The testimony of Dr. Durant on Friday last before that Committee discloses the first, most evident legal ground for the interference of the government. After much resistance, in response to the persistent interrogatories of the law officers of the government, Dr. Durant acknowledged this fact: that, after the Union Pacific Railroad Company had completed 238 miles of road at a cost for construction of $27,500 per mile, it made the contract with Oakes Ames for the construction of the road entire at $50,000 per mile, including the 238 miles which had already been constructed. In other words, the officers of the Union Pacific road practically took $23,500 per mile for 238 miles, amounting to more than five millions of dollars, from the government funds, of which they were trustee, and put the same into the pockets of themselves and a few friends, who styled themselves the *Credit Mobilier*. Dr. Durant also testified that, if economically constructed, the road might have been built for $65,000,000. This admission has created a very great impression upon the Committee, and upon the counsel for the government appointed to discover whether the United States had any cause of action against the Union Pacific, or *Credit Mobilier*. This fact is regarded as a deliberate fraud upon the Government. The interest in the investigation extends to all prominent members of Congress. A leading Senator recently remarked to your correspondent that, if these investigations continue, those railroads might have to consider the possible repeal of their charters by the next Congress. He said the law of politics is, that when there is so much howling about corruption, the people demand a victim, and that the possible shape in which such a demand might be made would be a popular issue for the repeal of the charters.

THE NORTHERN PACIFIC.

There have been gentlemen here all winter threatening an investigation into the affairs of the Northern Pacific Railroad. They claim to have papers and evidence to show that the road also had its *Credit Mobilier*, and that the disclosures made relative to the Union Pacific are insignificant when compared with the facts in their possession concerning the Northern Pacific. But for some mysterious reasons the investigation has not been demanded.

RAILROADS AND POLITICAL ELECTIONS.

The spasm of virtue that has seized Congress seems likely to result in the attempt on the part of Congressmen to make railroads the scapegoat for many evils. It seems evident that the Union Pacific road contributed $10,000 toward the election of Mr. Harlan to the Senate. It is scarcely less evident that a similar amount was used to assist in electing a Senator from Wisconsin. Mr. Bushnell, a managing director of the *Credit Mobilier*, testifies that he gave $5,000 to help Mr. Thayer to the seat which he held in the Senate. And there is a mysterious check of the Kansas Pacific road in the rooms of the Caldwell Investigating Committee, which Mr. Caldwell says was part of his election fund, and which the officers of the road insist was used for payment of "taxes," although the taxes had then long been delinquent, and the delinquent list had for some six weeks been advertised. It is the determination of Congress, just at this moment, to make some terrible examples of individuals and corporations, and such railroad companies as are in need of "railroad senators" will do well to rely more upon their "moral influence," or else become more circumspect in the selection of their "parliamentary agents."

GOAT ISLAND.

Your correspondent has heard much recent discussion concerning the Goat Island project among Senators. The impression is quite prevalent in that body that the bill is a fair one, that it is so carefully guarded that the interests of the government, and the real interests of the people of California, are protected, and that the bill will pass the Senate. The bill passed the House last winter.

The American Society of Civil Engineers and the Chapter System.

[Although this correspondent says that this letter is not for publication we venture to present it (without his name) as at least an expression of opinion and of interest in the welfare of the Society and anxiety for its greater usefulness.—EDITOR RAILROAD GAZETTE.]

SAVANNAH, Ga., January 16, 1873.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read, with interest, the several articles in your paper relating to such a reorganization of the American Society of Civil Engineers as would tend to increase its usefulness and its value to the profession.

The formation of local societies properly affiliated with a general association would popularize that institution, and would certainly be of benefit to the little knots of professional men scattered here and there throughout the country. Indeed, the permanency of such local societies could be better secured in no other way.

By connection with the parent society an engineer could then secure a proper introduction into professional circles wherever he might go; while the members of each local society would not only be measurably protected against pretenders, but would be afforded the opportunity of becoming acquainted with engineers of repute.

Other cogent reasons in favor of this plan occur to me as I write, but I have not the time to develop them. If it can be successfully put in force I am persuaded that the result will be of greater benefit to us all than will the adoption of the plan which you apparently favor.

My views are written hastily, amid a pressure of business matters, and not intended for publication; my letter is written merely to show an interest in the matter, and not with the expectation of throwing any light upon it.

The Meeting of Headings in the Hoosac Tunnel.

ENGINEER'S OFFICE, HOOSAC TUNNEL,
NORTH ADAMS, MASS., January 20, 1873.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In a late number of your paper I find a brief mention of this work and of the meeting of the headings, recently made, which effected a continuous opening from the east end of the tunnel to the bottom of the central shaft. Your notice is evidently taken from the statements of a reporter who visited the tunnel just after the junction had been accomplished, while the joining space was barely sufficient for the passage of a small-sized man, and the opportunity for close observation had not yet been made.

A few days later, when the enlarged space would permit the employment of suitable instruments, I produced from the nearest definitely marked stations—severally in their opposite directions to reach the point of junction—each of the two lines that had guided the workings in the heretofore separate chambers of excavation which had been extended from the east end for a little more than two and one-tenth miles westward, and from the bottom of the central shaft (1,028 feet deep) for a distance somewhat short of three-tenths of a mile eastward, and found the horizontal distance or departure of the two lines to be the five-sixteenths ($\frac{5}{16}$) fraction of an inch, and the difference between the planes of grade used to determine the elevations for working in these separate chambers was less than one-tenth ($\frac{1}{10}$) of a foot, or one and a quarter inches.

Only persons who have given some special attention to the matter can appreciate the labor of preparatory details and the observant care required in each stage of the progress, involving sometimes no small degree of difficulty and danger, by which a result so practically exact has been obtained. Those who have executed works of a similar character, but of much less magnitude, will most readily understand my wish to amend the incomplete and approximate mention above referred to by a statement of the actual result.

Believing it your desire to give correct information as to such details of the progress of important works as will interest many of your readers, I need make no apology for sending this communication.

BENJAMIN D. FROST,
Chief Engineer.

CHICAGO RAILROAD NEWS.

Chicago & Northwestern.

The extension of this company's road southward in the valley of the Fox as far as Batavia is but the beginning of a branch which it is intended to extend into the Illinois coal fields, and which will enable the company to carry coal along the lines of its road in Wisconsin and Minnesota, so that it can be sold cheaper than is possible at present. The consumption of coal increases constantly, not only by reason of the increase in population and manufactures, but by the growing scarcity of the supply of wood fuel, and there is no coal in Wisconsin or Minnesota.

Milwaukee & St. Paul.

This company cut the horse-car track on Halsted street, near Carroll, Sunday, January 12, and immediately laid its tracks up to and within its new freight houses on Halsted, Carroll and Union streets.

Chicago, Rock Island & Pacific.

The new passenger depot which this company is constructing in partnership with the Lake Shore Company approaches completion as rapidly as the weather will permit. All of the iron roof trusses are in place, and the arrangements for ventilation are nearly completed. The corrugated iron covering will be laid on at once, being all or nearly all on hand. The cupola and towers show their forms complete, and will soon receive the finishing touches. The galvanized iron cornices, etc., are nearly all in place, and the steam, gas, water and sewer pipes are laid, and the boilers in place.

The Storm.

Week before last the great storm interfered very seriously with the running of trains in northern Iowa, Minnesota and parts of Wisconsin. The Union Pacific, in remarkable contrast to its last winter's experience, has not had its trains stopped by the snow for a single day.

The Question of Tariffs.

In the Farmer's Convention at Bloomington, Ill., last week, the subject of railroad tariffs was the chief topic of consideration. Mr. Catlett, of McLean County, stated that the Farmer's Club in his county had discovered a "cheap plan of railroading," which consisted in paying to the road just the fare allowed by law. The Lexington Club, acting on this plan on their way to the convention had offered the legal fare; the railroad conductor refused to take it, and the club, as a consequence, passed over the route free. The idea of tendering only the legal fare seems to have become popular all at once. On Saturday last, the Principal of the Ludlow High School, with a party of fourteen others, determined to make a kind of test case, and decided to go from Ludlow to Champaign, on the Illinois Central road, tendering the 3-cent fare. The distance is 20 miles and the fare is 90 cents. The company, however, offered 60 cents only. The conductor would not take it; but told the gentlemen they must leave the train at the next station, Rantoul. The party refused to get off at Rantoul, and the conductor telegraphed to Chicago for instructions. The reply was to put them off. But the party refusing to be put off, the conductor telegraphed a second time that phase of the case, and received instructions to take the names of the gentlemen; to let them ride, but to refuse anything but the regular fare. The consequence was, of course, that their trip to Champaign cost them nothing. Ditto the return to Ludlow. One of the party, a Mr. Dillon, having nothing to do, and liking this cheap riding, determined to go on to Chicago, if possible, and did not get off. The first station north of Ludlow is Paxton, distant 5½ miles. Dillon offered 18 cents fare. The conductor demanded 25 or nothing, but ordered Dillon to get off; but he did not get off, and before he arrived at Lodi the conductor demanded fare again. Dillon then tendered $3.15 fare to Chicago from Lodi, the distance being 103 miles. The conductor demanded $4.15, or nothing, and allowed the passenger to ride to Chicago free rather than take the sum he offered. On Dillon's return, however, Saturday evening, he was politely and gently set off the train at Hyde Park. There is, apparently, a fixed determination on the part of certain people in some parts of the State to tender the fares allowed by the railroad law of the State and no more, and there is an equally strong determination on the part of the railroad companies not to take it. The railroad companies do not intend doing anything that can be considered rash or hasty, but will insist upon their chartered rights as they understand them until they shall have been finally interpreted by the highest judicial authority. If any offer fares below the regular rate, and refuse to pay the regular fares, they will be put off the trains. If they collect in masses too large for the conductor and his aids to manage, they may sometimes ride free, for the time at least. That seems to be the status of things now. In the mean time the companies, it is quite probable, will test in the courts the question whether they have or have not the right to regulate the tariffs on their roads, according to the terms of their charters. If it shall be decided that the roads have the right to regulate their fares, the companies will have the opportunity of recovering, if they choose, the fares which have been evaded, and the railroad companies have determined to take events cooly as they come, until a decision is rendered. It would be well if the farmers would consider whether they have the railroads, after all, as their enemies. The Illinois Central Railroad has done very much towards developing the wealth of the very farmers now engaged in fighting it. The company contended against great financial difficulties to establish its road, the stock, at one period, being of no higher market value than 45, and the first dividend paid by the company was in 1860. On through tickets from New York to St. Louis, the Illinois Central gets but $5.90 for a distance of 298 miles, which is less than two cents per mile. On through tickets from New York to New Orleans, the Illinois Central gets $8.53 from Chicago to Cairo, a distance of 365 miles, or a little over 2½ cents per mile. So the company's local fares range from about 3½ cents per mile to 4 cents. Competition makes these low rates necessary. The roads leading East from this city are all crowded far beyond their capacity with grain and pork seeking transportation. Not more than one half of what is offered can possibly be taken, and no reduction of rates would permit any larger exportation of corn or other low-priced products than at present.

Lake Shore & Michigan Southern.

Regular trains commenced running through to Lansing, on the Lansing Division of this road, January 13. The contractors have worked the northern end of the road for some time past. On the 1st of January, however, the company took possession and has commenced the running of regular trains as follows: Leave Chicago at 9 p. m. and 6:40 a. m., arrive at Lansing at 10:30 a. m. and 5:15 p. m. Trains leave Lansing for Chicago and New York at 11:10 a. m. and 4:30 p. m., arriving in Chicago at 9:20 p. m. and 6:30 a. m. The trains connect at Homer with the Michigan Central trains on the Air Line, and at Albion with the Michigan Central main line; at Eaton Rapids with the Grand River Valley Division of the Michigan Central; at Lansing with the Jackson, Lansing & Saginaw Division.

The agents of this road and of the Concord Line of steamers, and of the Red Line Transit Company, have occupied new quarters on the first floor, northwest corner of the new Sherman House. The office is very elegantly and tastily fitted up.

Michigan Central.

The report of the Treasurer, Mr. Isaac Livermore, for the six months ending December 1, 1872, shows an increase over the gross receipts of 1871, equal to $237,395.16—increase of net receipts $91,749.08. The construction account has been increased $3.518,276.10, and now amounts to $22,623,875.61. The company voted to pay a dividend of $4 per share, in stock, to holders of stock at the close of business hours, January 2, 1873, payment to be made January 27. President Joy has issued a circular which contains a full statement of what the road has done during the past year. From it we learn that 70 miles of double track have been graded, bridged and prepared for rail, about 40 miles of which have been laid and all would have been completed with three weeks more of pleasant weather at the close of the fall. Sixteen thousand tons of steel rails have been purchased and paid for. Fifty seven locomotives have been added, and more than one thousand flat and box cars. New and commodious machine shops have been completed at Jackson, Michigan, a new passenger house has been built at at the same place, and several others have been built at other points. Lands have been acquired in Detroit for new car shops, and twenty-six miles have been added to sidings in various places. The earnings of the last six months have been used in construction, and hence the directors have decided to pay stockholders this year in stock. Business has been done at considerable disadvantage, owing to the amount of construction going on, and the road has suffered largely from the inability of the Great Western road to transport over it the business brought with promptness by the Michigan Central. It is believed these obstacles will be removed early in 1873, either by the improvement of the Great Western, or the completion of competing lines with which the Michigan Central can connect.

North Chicago Street Railroad.

The North Chicago City Railway Company have elected the following board of directors: W. C. Goudy, George F. Rumsey, Jacob Rehm, W. H. Ferry, V. C. Turner. During the year 1872 the company has carried 2,900,000 passengers, one million less than for the year before the fire. It is now running the same number of cars as before the fire.

New York Railroad Legislation.

A correspondent of the New York *Tribune* writes from Albany:

"There is quite the usual amount of railroad legislation in prospect, both for city and country. Existing railroad corporations are well protected in the Assembly Committee on Railroads, which is said to contain no less than seven members who are either presidents or directors or salaried counsel of railroad companies. Vanderbilt's interests have been well looked after in making up the committee, and, so far as it is concerned, he will probably enjoy the sole privilege which his agents say he craves—that of being "let alone." Vanderbilt is said to be content with what he has got, and so long as he can be protected against "strikers," he will ask nothing from the Legislature. If they will let him alone he will let them alone. And yet it is rumored that the Commodore is to be here this Winter for an amendment to his Underground charter, which shall ask the city to pay half the expense of building the road below Forty-second street. On the other hand, among the bills that the Commodore would probably class as "strikes," the old "pro rata" freight scheme has already made its appearance again, and will have to be fought off or bought off as it has been so many times before.

RAILROAD GAZETTE

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A. N. KELLOGG & CO., *Proprietors.*
S. WRIGHT DUNNING AND M. N. FORNEY, *Editors.*

CONTENTS.

Editorial Announcements.

Correspondence.—*We cordially invite the co-operation of the railroad public in affording us the material for a thorough and worthy railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.*

Inventions.—*No charge is made for publishing descriptions of what we consider important and interesting improvements in railroad machinery, rolling stock, etc.; but when engravings are necessary the inventor must supply them.*

Articles.—*We desire articles relating to railroads, and, if acceptable, will pay liberally for them. Articles concerning railroad management, engineering, rolling stock and machinery, by men practically acquainted with these subjects, are especially desired.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

RAILROAD CONSTRUCTION IN 1872.

We gave so much space (and time) last week to our detailed account of the railroad construction in the United States during the year 1872, that we were unable to present much more than the aggregate mileage constructed in each State and in the whole country during the year.

If we consider the distribution of the new construction of 1872 we may learn some important facts. Grouping together the States on the coast, together with Vermont and Pennsylvania, as far as the Potomac, as the "North Atlantic States," we find that the total miles of new railroad constructed in these was 1,204; the "South Atlantic States," from the Potomac to the Gulf, including Florida, which borders both ocean and Gulf—six States in all—had 330 miles; the Gulf States, including all that touch the Gulf except Florida, had 550 miles, three-fourths of which was in Texas alone; the "South Interior States," in which we include Indian Territory, Arkansas, Tennessee, Kentucky and West Virginia, had 463 miles; the "North Interior" (Ohio, Indiana and Michigan) had 1,210 miles; what is still commonly called the "Northwest"—Illinois, Wisconsin, Minnesota, Iowa, Missouri, Kansas, Nebraska and Dakota—3,110 miles; the Pacific coast, 317 miles, and the vast district between the old "Northwest" and the Pacific States, 180 miles. Thus it is seen that about 42 per cent. of the entire new road is in what we know as the Northwest; and, what is more important in considering it in its relations to transportation, by far the largest part of this has its chief outlet for grain and other very heavy products and its principal buying and selling markets on Lake Michigan. The great lakes and the east-and-west railroads north of the Ohio will carry nearly all the traffic which these roads send to or take from the East. The States which actually touch the lakes, eight in number, built 3,350 miles of railroad in 1872; and though two of these, New York and Pennsylvania, make scarcely any exports eastward by these waters; they form one of their leading routes for carriage of heavy freights westward, and to New York incomparably the most important for the receipt of produce from the West. Besides nearly all of Iowa, Nebraska and Dakota, and probably one-third of Missouri & Kansas look to the lakes as the outlet for their grain. Thus we see that these navigable waters have a most important part to play in transportation and that they determine largely the location of a very large part of the railroads of the country. Perhaps one-fourth or one-third of the railroads constructed in the United States last year were built chiefly or largely to carry produce from the interior to the lakes, or from the lakes to the sea-board or the consuming districts of the East.

We now present a table giving the total mileage at the close of the years 1871 and 1872 in each State and Territory, together with the area of each in square miles. We have taken the figures from "Poor's Manual" for the mileage at the close of 1871, and will not be responsible for their accuracy. Probably it can be safely said that they are more nearly correct than any figures given for previous years; but we suspect that considerable errors exist in the reports for most of the States. It was only in 1871 that the mileage of Massachusetts was accurately determined, and the Railroad Commissioners of that State reported that it will probably be impossible to ascertain what was the actual length of railroad completed in that State at any date previous to September 30, 1871. We question very much whether any other State has now as accurate statistics as Massachusetts.

But taking these figures from "Poor's Manual" as the best attainable, and making some corrections for obvious errors (such as inserting in the table of territories Indian Territory with 124 miles of railroad, and Washington with 25 at the close of 1871, and adding the 149 to the total mileage for the country) we have the following table:

STATES AND TERRITORIES.	Area in Square Miles.	Close of 1871.	Close of 1872.
States.			
1. Alabama	50,722	1,671	1,805
2. Arkansas	52,198	258	414
3. California	188,981	1,013	1 208
4. Connecticut	4,674	820	845
5. Delaware	2,120	227	254
6. Florida	59,268	466	477
7. Georgia	58,000	2,108	2,154
8. Illinois	55,410	5,904	6,590
9. Indiana	33,809	3,529	3,714
10. Iowa	55,045	3 160	3,612
11. Kansas	81,318	1,760	2,205
12. Kentucky	37,600	1,123	1,366
13. Louisiana	41,346	519	542
14. Maine	31,776	871	933
15. Maryland	11,184	820	1,010
16. Massachusetts	7,800	1,606	1,643
17. Michigan	56,451	2,235	2,806
18. Minnesota	83,531	1,612	1,919
19. Mississippi	47,156	990	1,013
20. Missouri	65,350	2,580	2,894
21. Nebraska	75,995	828	1,040
22. Nevada	112,090	593	611*
23. New Hamp-hire	9,280	790	833
24. New Jersey	8,320	1,265	1,368
25. New York	47,000	4,470	4,894
26. North Carolina	50, 04	1,190	1,250
27. Ohio	39,964	3,740	4,196
28. Oregon	95,244	189	241
29. Pennsylvania	46,000	5,113	5,364
30. Rhode Island	1,306	136	136
31. South Carolina	29,385	1,201	1,289
32. Tennessee	45,600	1,520	1,535
33. Texas	237,504	865	1,339
34. Vermont	10,212	675	706
35. Virginia	40,904	1,490	1,540
36. West Virginia	23,000	485	561
37 Wisconsin	53,924	1,725	2,174
TOTAL STATES	1,950,171	59,537	66,306
Territories.			
1. Arizona	113,916	....	....
2. Colorado	104,500	393	497
3. Dakota	147,490	....	234
4. District of Columbia	60	*	....
5. Idaho	90,932	....	....
6. Indian	71,000	127	276
7. Montana	143,776	....	....
8. New Mexico	121,201	....	....
9. Utah	80,056	375	432
10. Washington	69,994	25	65
11. Wyoming	93,107	498	498
TOTAL TERRITORIES	1,036,032	1,414	1,999
Aggregate, United States	2,986 203	60,951	68,305

* Included in Maryland.

This gives the area in square miles to mile of railroad in the several States and Territories as follows:

	Area.		Area.
Alabama	28.10	Missouri	22.58
Arkansas	126.08	Nebraska	73.07
California	156.44	Nevada	183.45
Connecticut	5 53	New Hampshire	11.14
Delaware	8.28	New Jersey	6.08
Florida	124.25	New York	9.60
Georgia	26.92	North Carolina	40.56
Illinois	8.41	Ohio	9.52
Indiana	9.11	Oregon	395.20
Iowa	15.24	Pennsylvania	8.57
Kansas	36.88	Rhode Island	9.60
Kentucky	33.48	South Carolina	22.80
Louisiana	76.28	Tennessee	29.70
Maine	36.48	Texas	191.70
Maryland	11.07	Vermont	14.46
Massachusetts	4.75	Virginia	26.56
Michigan	20.12	West Virginia	41.00
Minnesota	43.53	Wisconsin	24.80
Mississippi	46.59		

The average for the whole United States, including the territories, is one mile of railroad to 43.07 miles of surface, and the average number of people per mile of road, according to the population returns of the census for 1870 (since increased probably by something like 8 per cent.), is about 570 per mile; but taking the States only, there are 29.4 square miles of surface, and 576 people per mile of railroad.

The Western and Southern Railway Association.

We are sorry that we are unable to publish this week a somewhat extended report prepared for this number of the meeting of this Association held in St. Louis on the 15th.

The meeting, which was the annual one, was appointed for the 14th, but so very few were present that day that it was adjourned until the next day, when representatives were present from thirteen companies only, six of which have termini in St. Louis.

Mr. Thomas Allen, the President, read an annual report, in which he recounted the history of the Association and its transactions, mentioning as two of the most important of the abuses proposed for abatement by its action, the system of free passes and the payment of commissions on the sale of tickets. He also mentioned the proposed change of the Association from a local to a national one.

This change was made by resolutions which establish the name as the "Railway Association of America," instruct the Secretary to invite the proper officers of all railroads in the country to become members, and establish the times of regular meetings on the second Wednesdays of May and October.

Hon. Thomas Allen was chosen President for the ensuing year; Albert Fink, Vice-President; Charles Paine, Secretary and Treasurer, and L. J. Fleming, J. C. McMullin, Edmund S. Bowen, W. K. Muir and Horace Scott an Executive Committee.

But few committee reports were ready for presentation, and these were postponed until the next meeting, which is to be held at the St. Nicholas Hotel, in New York, on the 14th of May next.

Among the Shops.

A visit to Philadelphia and Wilmington on Friday and Saturday of last week and Monday of this has given opportunity for making sundry observations, notes of which are presented below.

We found the manufacturers of Philadelphia nearly all busy, with many orders ahead. The Baldwin Locomotive Works are full of work up to next August. They built 422 locomotives in the year 1872. In October they completed 41, in November 41, and in December 42, so at that rate they will turn out 500 locomotives in 1873, should the orders continue. Wm. Sellers & Co., Wm. B. Bement & Son, Ferris & Miles, and Edwin Harrington are all full of orders and working to their full capacity. The same is true of the manufacturers of engineers' instruments. We heard considerable complaint about the difficulty of making collections, which seems to be general. A. Whitney & Sons are putting a temporary wooden roof over their foundry. Our readers may remember that the old one was blown off in the storm of a few weeks ago. The whole roof, from one end to the other of the building, fell in, as is supposed, by the wind tearing away a portion of the corrugated iron with which it was covered, and which was depended upon for staying the roof trusses laterally. The result was that when one truss fell it carried all the rest with it. The proprietors will replace it with a much heavier truss and more secure lateral bracing. Up to the time of the accident the proprietors were making "steeled" wheels. The process of making these was described about a year ago in the RAILROAD GAZETTE. Since that time they have used a combination of wrought iron with cast, with results equally good as those produced with steel.

While in Philadelphia we also visited the Scale Works of Riehle Bros., who, although not so full of orders as the other machine shops, are doing a fair business. We also called on Davis, Hatch & Co., intending to get and give some information regarding their business and productions, but they were "too busy" to give it or to be quite civil. In the latter respect they were unlike any other Philadelphia business men with whom we had any intercourse. Messrs. Nichols, Pickering & Co. we found at their business of making springs and preparing for large orders in 1873.

From Philadelphia we journeyed to Wilmington, where we also found manufacturers busy. The Harlan & Hollingsworth Works have just occupied their new car shop, which we regretted not having the requisite time to examine more carefully. It is a very large two-story wooden building, and is now one of the best shops of the kind we know of, and increases very much their facilities for doing work. They have completed nearly all of their old orders, and are now prepared to supply cars at very short notice. The Jackson & Sharp Company has more orders ahead, and is now at work on eleven cars of 3-feet 6-inch gauge for a South American road. They are all built in sections, and when completed are taken apart for shipment. They are 35 feet long and 7 feet 6 inches wide. The company is also filling an order for twelve Pullman sleeping-cars, and has various other orders booked (as our English friends express it) for Canadian, Western and Southern railroads.

Bowers, Dure & Co. also have as many orders as they can now fill.

The old spring works formerly owned by Edwin J. Horner had changed hands, we found, and are now owned and managed by Mr. Wm. H. Schoen, who will doubtless infuse fresh energy into the old business. We called at the tool works of Hilles & Jones, but were unfortunate in not finding either of the firm at home.

We were somewhat surprised to learn that Mr. Perry, long the Master Mechanic of the Philadelphia, Wilmington & Baltimore Railroad, had resigned. He has gone to Boston to reside, and, we learn, has bought himself a comfortable home in the suburbs of that city. Mr. S. A. Hodgeman, formerly Assistant Master of Machinery of this road, but for some months past Superintendent of the Wilmington & Western Railroad, is Mr. Perry's successor.

We had very little time to look through the shops, but found that everything was in very excellent condition, and the engines were kept in the best of order. Mr. Hodgeman has several freight engines on the stocks, and one of the boilers nearly completed. It is made of Hussey, Wells & Co.'s steel all through. The shell is $\frac{7}{16}$ inch thick, double-riveted in the longitudinal and fire-box seams, and the holes are all *drilled*. This is done before the plates are bent and not after they are

"assembled together." In drilling them separately, of course, the same difficulty exists in getting the holes to match that is experienced when they are punched, and we doubt whether all the advantage resulting from drilling plates can be realized unless one set of holes is drilled from the other.

Mr. Hodgeman showed us what seemed a very ingenious arrangement for testing the hardness of steel rails. It consisted of a drop working on a vertical slide, and provided with a chisel, the edge of which, instead of being straight, was curved or crescent-shaped. Of course, the softer the rail, the deeper would the chisel cut or indent it in falling a given distance. Owing to the curved form of the chisel-edge, of course the deeper the indentation the longer would it measure on the surface of the rail. Therefore, in order to test the relative hardness of rails, it is only necessary to determine upon some given height of fall and measure the length of the indentations of the chisel, in order to compare them. The machine was, we believe, designed by one of the firm of Wm. Sellers & Co., of Philadelphia.

As the question is frequently asked how thin steel tires may be run with safety, we may say that we were shown two sets of tires on engines, on each of which the main driving-wheel was without flanges, one set of which was only 1¼ inches thick, and the other 1¼ inches. They were Vickers' tires.

Our observations in Wilmington were somewhat abruptly terminated by the arrival of the train for Baltimore. We will finish our notes in the same sudden way, chiefly because we have nothing more to write.

Train Accidents in December.

About the first of the month, the locomotive and baggage car of a night express train on the Allegheny Valley Railroad were thrown from the track near the Clarion bridge by a switch which had been turned half way on and wedged in that position, so that a train would not run upon either track. The train was moving very slowly at the time, or the consequences would probably have been more serious.

On the morning of the 1st, there was a collision between up and down freight trains on the New Orleans, Jackson & Great Northern Railroad between Independence and Amité City, La., about 65 miles north of New Orleans. The engineman and fireman of the down train were injured, and several cars were wrecked.

On the morning of the 2d, an express train on the Erie Railway encountered a freight car on the track at Turner's, N. Y., by which the express was thrown from the track and one passenger killed and others injured. The freight car had been left on a switch of steep grade up from the main track, and, owing to a defective brake, it is said, it ran back upon the main track and had attained considerable speed when the express struck it.

On the morning of the 2d, the passenger coach and rear freight car of a mixed train on the Harlem Extension Railroad jumped the track about a mile north of South Shaftsbury, Vt., turned completely over, and lodged in the ditch bottom up. A conductor and engineman (not serving on that train) were seriously injured. One report says that the accident was caused by a block of marble falling under the wheels of the coach, another that it was probably a broken rail which occasioned the mischief.

On the morning of the 2d, there was a collision between two freight trains on the Illinois Central Railroad a few miles south of Paxton, Ill., by which both engines were considerably damaged.

On the morning of the 2d, near Morrisville, Pa., on the New York Division of the Pennsylvania Railroad, a portion of the Washington express train jumped the track, causing a delay of some hours, but injuring no one.

On the morning of the 3d, a west-bound mail train on the Wilmington & Western Railroad encountered some rocks which had fallen upon the track in a cut near Cuba Hill, Del., by which the front truck of the mail and baggage car was driven back from the front to the rear of the car. No car left the track, however.

On the morning of the 3d, at Tacony, Pa., on the New York Division of the Pennsylvania Railroad, a part of a freight train was thrown from the track, causing a slight delay.

On the afternoon of the 4th, all the passenger cars of a north-bound passenger train on the South & North Alabama Railroad were thrown from the track about 10 miles south of Birmingham, Ala., the engine and baggage car remaining on the track. Fifteen persons were more or less injured.

On the evening of the 4th, an engine on the transfer track of the Union Pacific Railroad (leading from Omaha across the Missouri River bridge to a connection with the eastern roads in Council Bluffs) ran into the rear of a "dummy train," consisting of two street cars drawn by a dummy engine, in Council Bluffs, breaking up both cars, damaging the dummy, and injuring two passengers considerably. The dummy train is reported to have had proper signals out, and the blame is laid on the engineman of the following locomotive.

Early in the morning of the 5th, a south-bound freight train on the Southern Pacific Railroad of California ran into a cow which was caught on a culvert, and was thrown into the ditch, three cars being utterly wrecked. The engineman was slightly hurt.

On the morning of the 5th, several cars of a passenger train on the Dayton & Union Railroad were thrown from the track between Dodson and West Baltimore, O.

On the morning of the 5th, the locomotive and baggage car of a west-bound passenger train of the Chicago & Northwestern Railway were thrown from the track by a misplaced switch at Grand Mound, Iowa.

On the 5th, as an engine was pushing two flat cars at a rapid rate on the Virginia & Truckee Railroad near Carson, Nev., it ran into a horse, and cars and engine were tumbled into the ditch, severely injuring a yard man who was on one of the cars, and killing a man who was riding on the engine.

On the 5th, several cars of a freight train on the Toledo, Peoria & Warsaw Railway were thrown from the track and upon their sides near Gridley, Ill. In one of the cars, which was loaded with lumber, were found the bodies of two men who had been stealing a ride.

On the 5th, at Clayton, Iowa, on the Chicago, Dubuque & Minnesota Railroad, an extra freight train ran into the rear of a regular freight train, which was waiting at the station, wrecking the caboose and four or five empty box cars, damaging the engine considerably, and killing a passenger between two cars.

On the evening of the 5th, a mail train on the Blossburg & Corning Railroad ran off the track about two miles from Corning, N. Y., and the baggage car went down the bank and broke through the ice into a stream. The conductor was badly hurt.

On the night of the 5th, near Barnesville, West Va., on the Baltimore & Ohio Railroad, an entire mail train was thrown from the track, and one person injured.

About 10 o'clock at night on the 5th, the rear section of the east-bound "Cincinnati express" train on the Pennsylvania Railroad ran into the forward section, and one sleeping car ran into the other about 20 feet, or "telescoped." Five passengers were killed and three injured. The rear end of the rear sleeping car was not much injured, but its front end mounted the platform of the sleeping car in front of it and crushed through nearly half its length. The following account of the circumstances is given by the Harrisburg *State Journal*:

"The first section, or train, of the Cincinnati express east left Altoona 37 minutes late, and the second 1 hour and 16 minutes late. They passed Lewistown, the first 40 and the second 52 minutes late. The first train stopped at Bixler's (a water station), two miles east of Lewistown, for water, and as usual percussion caps were placed on the track to warn the following train. The steam generating apparatus of the engine of the first train became defective, owing to the bad quality of the coal, and was consequently unable to make schedule speed. The second train overtook them and ran into them with the results above stated. When about two hundred feet off the engineer of the second train saw the rear of the first. He immediately put on the air brakes and reversed the engine, and doing it very quickly, the coupling between the engine tender and express car parted, and the second train came quietly to a stop, the passengers in it knowing nothing of an accident. The engine being relieved, started forward with increased speed, and struck the forward train with such violence as to partly demolish the two rear cars. It so happened that just before the collision a coupling broke in the first train also. Notwithstanding, had the coupling of the second train not broken, there would have been no collision, the fatal results being entirely due to this unforseen casualty."

On the night of the 6th, on the Illinois Central Railroad, near Danforth, Ill., six cars of a north bound freight train were wrecked by a broken rail, and, it is reported, more than two hundred hogs were killed.

On the morning of the 7th, a passenger train on the Worcester & Nashua Railroad was thrown from the track about a mile north of Worcester, Mass. Three cars were thrown on their sides, but though there were 250 passengers on the train no one was seriously injured.

On the night of the 7th, on the Western Division of the Chicago & Alton Railroad, near Washburn, Ill., the trucks of a car loaded with stock gave way, and one end of the car fell to the track and ran off. No appreciable damage was done, the stock in the car not being injured.

Very early on the morning of the 8th, an east-bound passenger train of the Indianapolis & St. Louis Railroad was thrown from the track by a mis-placed switch near White River, Ind.

On the morning of the 9th, a train of the Cincinnati, Hamilton & Dayton Railroad ran into an express train of the Cleveland, Columbus, Cincinnati & Indianapolis at the crossing near the depot in Cincinnati. Cars of both trains were thrown from the tracks, and a delay of some hours was the consequence. Both were moving slowly.

On the 10th, near Tomahawk Station, Va., on the Richmond & Danville Railroad, there was a collision between up and down passenger trains, by which no one was hurt. Most of the passengers in one of the trains, it is reported, were stockholders on their way to attend the annual meeting.

On the 10th, an express train on the Minnesota Division of the Milwaukee & St Paul Railway was wrecked by a broken rail near Blooming Prairie, Minn., one car being shattered and a brakeman injured.

About the 10th, on the Morris & Essex Division of the Delaware, Lackawanna & Western Railroad, five cars were thrown from a switch, and three of them went down the embankment and were broken up.

On the night of the 10th, at Metuchen, N. J., on the New York Division of the Pennsylvania Railroad, a way freight train ran into the rear of another freight train as the latter was slowing up. Several cars of the forward train and the locomotive of the other were badly wrecked, and the road was blocked about seven hours.

About 4 o'clock in the morning of the 11th, at Franklin, Pa., on the Ashtabula & Franklin line of the Lake Shore & Michigan Southern Railway, as an oil train was crossing the bridge near French Creek, after the engine and two cars had passed safely the third car and several following it jumped the track. Fortunately they all remained on the bridge, and the delay in re-railing the cars in such a confined space was the most serious result of the accident.

On the night of the 11th, at South Branch Bridge, on the Baltimore & Ohio Railroad, 17 miles east of Cumberland, Md., as a train consisting of a locomotive and twenty loaded coal cars was crossing, the center span of the bridge gave way, and the whole train fell 30 or 40 feet into the river. The engine had crossed the span which broke, and the last car had not reached it; but they were dragged down by the other cars. The whole train crew went down with the wreck, and the fireman was killed, and the conductor, engineman and brakeman were severely injured.

On the evening of the 12th, the engine and three cars of a freight train of the Cleveland & Pittsburgh Railroad were thrown from the track by a misplaced switch in the Pittsburgh shifting yard, utterly wrecking the engine and tearing up the track for some distance. The switch is reported to have been misplaced maliciously.

About 4 o'clock on the morning of the 13th, the engine, tender, express and baggage cars and one coach of an east-bound express train on the Pacific Railroad of Missouri were thrown from the track by a defective rail near Augusta, Mo. The baggage master and express messenger were severely bruised.

On the morning of the 13th, a man tried to drive a team hauling a log across the track of the Erie Railway near Basket Station, but the log caught on the track and could not be moved by his team. Hearing the whistle of an approaching express train at a station three miles west, he unhitched his horses, drove them to a place of safety, leaving the log on the track, and only signalled the train to stop when it was close at hand—so close that it struck the log with tremendous force, threw it from the track, was thrown from the rails, ran over a short bridge on the ties, and then went into the ditch—all without hurting any one, though the engine was thrown across the track a complete wreck.

On the morning of the 13th, a few miles east of Richwood, Ohio, on the Atlantic & Great Western Railway, there was a collision between two freight trains, by which both locomotives were badly wrecked, one being thrown over a bridge down twenty feet into a creek, and four cars of merchandise were burned up.

About 10½ o'clock on the night of the 13th, as an extra freight train on the New York Division of the Pennsylvania Railroad was passing South Trenton, the brake from off one of the cars fell upon the track, threw off one car and pulled the trucks from under two others, blocking the road about three hours.

On the afternoon of the 14th, a west-bound passenger train on the Northern Division of the Milwaukee & St. Paul Railway, consisting of engine, tender, baggage car, two first-class and one second-class car, was thrown from the track three miles west of Schwartzburg, Wis., by a broken rail, which the engineman saw before he struck it, but not in time to stop. Thirteen passengers were injured, most of them not seriously.

On the afternoon of the 15th, at Danville Junction, Ill. (at the crossing of the Toledo, Wabash & Western and the Indianapolis, Bloomington & Western), there was a collision between a west-bound freight train on the former and an east-bound freight on the latter. The Wabash train stopped as usual on approaching the crossing, and then proceeded; but the Bloomington train did not stop, as it had a steep grade to go up at that point, and it was found that it would have to double if it lost its momentum by stopping. The station buildings concealed the trains from each other. The locomotive of the Bloomington train struck the Wabash train a few cars from the engine, turned over itself and piled three or four of the Wabash cars on top of it. The fireman of this engine had no knowledge whatever of the proximity of the other train, and was putting in a fire when the shock came which tumbled over his engine and nearly drowned him with water from the tender. While the train-men were searching for him, however, he crawled out of the ruins unhurt and, as they say, "ran away from the wreck like a scared dog," which, indeed, no one can blame him for doing. There was no semaphore at this crossing.

About the middle of the month, a north-bound train on the Wilmington & Reading Railroad ran into two horses which were standing on the track near Laurel Station, Pa., causing such damage that the train was delayed about two hours.

On the morning of the 16th, at the Harrisburg depot of the Lebanon Valley Branch of the Philadelphia & Reading Railroad, there was a collision between two engines, which caused slight damage to a few freight cars.

On the night of the 16th, on the New York Division of the Pennsylvania Railroad, near Monmouth Junction, N. J., an extra freight train ran into the rear of a regular freight, breaking six cars, pretty much destroying two, injuring the engine somewhat, and slightly injuring a man in the caboose car.

On the night of the 17th, a freight train of the Indianapolis Cincinnati & Lafayette Railroad ran off the track near Greensburg, Ind., causing a delay of nine hours.

On the night of the 17th, a freight train on the Boston & Providence Railroad was wrecked at Dodgeville, Mass., 30 cars being thrown from the track. A man who was stealing a ride was killed.

On the night of the 17th, about 11 o'clock, there was a collision between a freight train and an emigrant train on the Central Railroad of New Jersey close to Bloomsbury, N. J. Thirty freight cars were broken up, the emigrant train engine was a total wreck, and two baggage cars behind it telescoped.

On the morning of the 18th, there was a collision in Jersey City between two locomotives of the Pennsylvania Railroad, causing damage reported at $4,000.

On the morning of the 18th, about a mile north of Reynolds, Mich., on the Grand Rapids & Indiana Railroad, the rear coach of a south-bound express train was thrown from the track by a broken rail, and lodged in the ditch bottom up. The car caught fire from the stove, but that was soon put out. Eight persons were injured, three of them dangerously.

On the 18th, between Pine Valley and Millport, N. Y., on the Northern Central Railway, a through freight train ran into the rear of a local freight which had halted on a bridge because of a broken rail which had been discovered ahead. Two passengers on the caboose of the local freight were killed. They were standing on the platform as the train approached and seemed too much frightened to leave it.

On the night of the 18th, as a south-bound freight train on the Chicago & Alton Railroad was entering a side-track at Anderson station, Ill., to clear the main track for a following passenger train, the engine ran off at the frog and left the whole train

of cars on the main track. A signal was sent back to stop the passenger, but it either was not seen or not observed, and the passenger train ran into the rear of the freight, killing the engineman, injuring the express messenger, wrecking the engine, and destroying the rear car of the freight train.

About 5 o'clock in the morning, on the 19th, the boiler of a switching engine on the Louisville, New Albany & Chicago Railroad exploded as it was standing in the streets of Lafayette, Ind., killing the engineman and badly injuring a youth who was on the engine at the time. The engine was blown to fragments, and the houses on both sides of the street were riddled by the pieces.

On the morning of the 19th, a coal train on the Lehigh & Susquehanna Railroad ran at good speed into the rear of a very long coal train which had halted near Allentown, Pa. The engine of the moving train and 31 cars, of both trains, were thrown from the track and down a bank about eight feet. The caboose car was set on fire by its stove and was burned. The forward train sent back a man to flag the following train, but it was too quick for him. No one was hurt.

On the morning of the 19th, the locomotive and several coaches of a north-bound train from Cincinnati to Chicago were thrown from the track of the Illinois Central Railroad, near Matteson, Ill., by a broken rail. They were overturned in the ditch, and the engineman and baggageman were somewhat injured.

On the 19th, as a train on the Old Colony Railroad was about to enter the station at Plymouth, Mass., the locomotive was to run on one track, and the cars, by a flying switch, be shifted to another. The latter manœuvre failed, however, and the cars ran into the engine, damaging it a little and breaking the leg of a passenger who was standing in one of the cars.

On the night of the 19th, between Sloatsburg and Southfield, on the Eastern Division of the Erie Railway, a freight train broke in two as it was rounding a curve on a down grade. It was halted in order to put in a new drawhead, but before this was done an extra freight ran into its rear, demolishing the caboose and two or three coal cars, while the engine of the extra was thrown across the track and badly damaged. The road was blocked for several hours.

On the night of the 19th, on the Bordentown Branch of the Amboy Division of the Pennsylvania Railroad, about half-way between Trenton and Bordentown, there was a collision between up and down freight trains by which five or six cars in both trains were badly wrecked and piled together, and five or six more were damaged; the engines also were injured, and the total loss has been estimated at $10,000. The fault is said to have been with the up train, which left a station when it should have waited there.

On night of the 19th, a west-bound express freight train on the Lake Shore & Michigan Southern Railway was thrown from the track by a mis placed switch near Miller's Station, Ind., and the locomotive and eleven cars went into the ditch. A brakeman was killed. The coroner's jury held the switchman guilty of gross carelessness.

On the night of the 19th, a west-bound express train on the Pittsburgh, Fort Wayne & Chicago Railway was thrown from the track by a broken rail a few miles west of Fort Wayne, Ind., delaying the train for some hours.

About 4 o'clock in the morning on the 20th, on the Missouri Pacific Railroad at South Point, about 50 miles west of St. Louis, a rail broke under the locomotive, and the five freight cars following were thrown from the track.

On the morning of the 20th, on the Michigan Central Railroad, 14 miles east of Jackson, Mich., there was a collision between a wild engine and a freight train, which blocked the road for some time.

On the 20th, a passenger train on the Stonington & Providence Railroad ran through a switch which had been left open and into a freight train which was standing there, disabling the engine and damaging the cars.

On the 21st, a train on the Missouri River, Fort Scott & Gulf Railroad ran off the track at the Union Depot in Kansas City, Mo., and a passenger car was thrown from its trucks.

On the evening of the 21st, an east-bound passenger train of the Western Union Railroad when on the Madison Division of the Milwaukee & St. Paul Railway about three-quarters of a mile east of Waukesha, Wis., encountered a broken rail, which threw the rear passenger car from the track and down an embankment 12 feet high, lodging bottom up. The car caught fire, which was soon extinguished, and the ten persons in the car were rescued, six of them seriously injured, and two of them dangerously.

On the night of the 21st, three cars of a freight train on the Seaboard & Roanoke Railroad ran off the track in the city of Norfolk, Va., blocking the road for several hours and causing passengers to miss their connections.

About 4 o'clock in the morning of the 23d, near Tomah, Wis., on the La Crosse Division of the Milwaukee & St. Paul Railway, a rail broke under the locomotive of an east-bound passenger train. The engine and two cars passed over safely, but two coaches and a sleeping car were thrown from the track and down a low embankment. One passenger was killed (in the act of jumping from the car) and six injured.

Early in the morning of the 23d, a freight train ran into the rear of a passenger train which was fast in the snow on the Atchison, Topeka & Santa Fe Railroad, thirteen miles west of Newton, Kan., demolishing passenger and baggage cars and killing two persons and injuring four others. The baggage, mail and express cars caught fire from the stoves and were burned. It is reported that a signal had been sent back properly to stop the freight, but that the engineman for some reason failed to notice it.

On the morning of the 23d, about 4 o'clock, as a freight train was running on the Cincinnati, Hamilton & Dayton Railroad a few miles south of Miamisburg, Ohio, the trucks broke under a flat car, and three or four cars and the engine were thrown from the track and on the side of the embankment. The car whose truck broke was loaded with a locomotive weighing 33 tons, but it was doubtless made for the purpose of carrying locomotives.

On the morning of the 23d, on the Chicago & Northwestern Railway two miles west of Mechanicsville, Iowa, eight cars of a freight train were thrown from the track by a broken rail.

On the morning of the 23d, an accomodation train on the Stonington & Providence Railroad ran into a freight train at Westerly, R. I., owing to a misplaced switch, damaging the rolling stock considerably.

On the morning of the 23d, a west-bound passenger train on the Baltimore & Ohio Railroad ran off the track near Cameron, W. Va., causing six hours delay.

On the morning of the 23d, a freight train bound north on the New York Division of the Pennsylvania Railroad ran off the track between South Elizabeth and Elizabeth, wrecking several freight cars and delaying passenger trains for several hours.

On the evening of the 23d, on the Jeffersonville, Madison & Indianapolis Railroad at Henryville, Ind., the engine and eleven cars of a south-bound freight train were thrown from the track by a misplaced switch and down the bank about four feet, and the engineman, fireman and one of the brakemen were instantly killed. It is reported that a passenger train passed the switch two hours earlier and left it properly set for the freight; it has been suspected that it was opened with malicious intent. The engine and eleven cars were a total wreck.

On the night of the 23d, on the Wisconsin Division of the Chicago & Northwestern Railway near Harvard, Ill., six coaches of a passenger train were thrown from the track and considerably broken up. The engineman and a fireman were somewhat injured.

On the night of the 23d as an east-bound passenger train on the Iowa Division of the Illinois Central Railroad was running through a deep cut and under a wagon bridge a mile east of Epsworth, Iowa, all the cars—a baggage, mail and express, two coaches and one sleeping car—were thrown from the track and turned over on their sides. The express messenger and a prssenger were seriously injured. The derailment is supposed to have been caused by a broken rail.

About 5 o'clock in the morning on the 24th, a coal train on the Amboy Division of the Pennsylvania Railroad broke into three sections near Jamesburg, N. J., and the rear section finally ran into the middle section, injuring some of the cars.

On the morning of the 24th, the caboose car of a freight train on the Eastern Division of the Erie Railway was thrown from the track near Southfield, N. Y., by the breaking of an axle, after which it caught fire and was entirely burned.

On the morning of the 24th, a train was thrown from the track by a broken rail on the Air Line Division of the Michigan Central Railroad.

On the afternoon of the 24th, as a mail train, consisting of a locomotive, tender, baggage-car and one coach, was approaching Prospect Station, N. Y., on the Buffalo, Corry & Pittsburgh Railroad, running over a high trestle-work at the rate of about six miles an hour, on a down grade, the flange of a tender wheel broke, the wheels mounted the rails, and after running a short distance in this way the cars left the track, and the rear end of the baggage car and the front of the coach went over the trestle-work, and the two cars fell bottom up about 30 feet to the ground, the trucks crushing in the floor. Then instantly the wood-work caught fire from the stoves, and very soon the cars were totally burned. The car was full, and scarcely a person on the train escaped uninjured, 19 having been killed and 17 injured. Most of the killed were burned with the car; but most of the injured seem to have suffered otherwise than by fire. As the train was running so slowly, the shock of the fall so great a distance must have caused these injuries. A correspondent who examined the track says: "The accident was undoubtedly occasioned by the wheel coming in contact with the end of a sound rail which projected above the one next it, which was much worn and worthless."

On the evening of the 24th, at Grafton, Mass., on the Boston & Albany Railroad, an east-bound freight train ran into the rear of another which had been delayed a little, breaking badly the caboose of the forward train, and forcing from their fastening the drawbars of fourteen of the cars. The danger signals were given by the brakemen of the first train, and also by a switchman at a siding near by, but when the following train passed the turn-out, the engine was so surrounded with escaping steam that objects a few feet distant were invisible. One train man was slightly hurt.

On the night of the 24th, two miles north of New Britain, Ind., on the Indianapolis, Peru & Chicago Railroad, the forward truck of the rear coach of a south-bound passenger train was thrown from the track by a broken rail. The rear truck kept its place until the coupling broke, when the car went down an embankment about six feet high. Thirteen passengers were more or less injured.

Early in the morning on the 25th, a sleeping car of a south-bound passenger train on the Jeffersonville, Madison & Indianapolis Railroad was thrown from the track by a broken rail near Edinburg, Ind.

On the 25th, before daylight, a through west-bound freight train on the Michigan Central Railroad ran into a train of empties which a switching engine had been pushing toward it, near Air Line Junction, west of Jackson, Mich., but which had just been brought to a halt. A night switchman was standing on the step in front of the switching engine, and the force of the collision drove the car adjoining upon this step, crushing the switchman against the boiler head and injuring him fatally.

On the 25th, the two middle coaches of a west-bound passenger train on the Baltimore & Ohio Railroad were thrown from the track by a broken rail near Oakland, W. Va., and went down an embankment about 30 feet high, severely injuring two passengers.

On the afternoon of the 25th, by the breaking of a switch bar on the Kenosha & Rockford line of the Chicago & Northwestern Railway, a passenger train was parted, and part went on one track, part on another, and part between the two. An express messenger was somewhat injured.

On the night of the 25th, about 11 o'clock, a freight train was thrown from the track and several cars wrecked on the Erie Railway at Slade's Switch near Buffalo, by a rail which had been placed in the frog for the purpose.

On the night of the 25th, the locomotive and several cars of a west-bound passenger train on the Baltimore & Ohio Railroad were thrown from the track near Frederick Junction, Md., by a cross-tie which some one had placed across the track. The fireman was badly bruised.

On the night of the 25th, at Heraman Station, on the Toledo, Wabash & Western Railway, a freight train ran into a locomotive which was preceding the train, but had stopped for wood. Both engines were somewhat injured, and most of the draw-bars of the cars were rendered useless.

About 8 o'clock in the morning of the 26th, a west-bound freight train on the Des Moines Valley Railroad ran off the track about four miles west of Ottumwa, Iowa, wrecking five empty stock cars and a way car.

On the morning of the 26th, a south-bound way passenger train on the Erie Railway was halted by a north-bound freight which switched over to the down track at Allendale, N. J., to permit a north-bound express to pass it. While these two trains stood facing each other on the down track, the way train having sent back a signal a considerable distance, a stock train came down the track and ran into the rear car of the way train, and pushed it into the car ahead, fatally injuring one passenger. There was a blinding snow storm at the time, but it is reported that the signalman was observed and brakes put on the freight train early enough, and that the track was so slippery that brakes had very little effect.

On the morning of the 26th, an east-bound passenger train on the Central Railroad of New Jersey, in a thick snow storm, ran into the rear of a coal train near Annandale, N. J., wrecking the caboose and several cars of the coal train and damaging the locomotive of the passenger train. The coal train was stuck in the snow, which was so deep that the flagman had to move back very slowly.

On the morning of the 26th, an up passenger train on the Little Miami Division of the Pittsburgh, Cincinnati & St. Louis Railway ran off the track near Morrow, Ohio, doing little damage to person or property.

About noon on the 26th, in a heavy snow storm, a train on the Morris & Essex Division of the Delaware, Lackawanna & Western Railroad had reached South Orange and the cars were left on the main track while the locomotive ran up to the water-tank. At this moment the Easton express came up with two locomotives, and the engineman, being prevented from seeing any signals by the storm, ran into the rear of the preceding train, damaging the forward locomotive considerably and smashing the platform of the rear car. The express train was moving slowly at the time.

On the night of the 26th, five coaches of an east-bound passenger train on the New York Central & Hudson River Railroad were thrown from the track by the breaking of a switch-bar, between Schenectady and Albany. They came to a stand in a zig-zag line across the three tracks, but none of them turned over and no one was hurt.

About 4 o'clock on the morning of the 27th, on the Louisville & Nashville Railroad near Glasgow Junction, 75 miles from Louisville, a passenger train struck a broken rail. The engine passed over safely, but the rest of the train, consisting of baggage car, sleeping car and two coaches, after running a short distance on the ties, went down the embankment about 15 feet, and all turned over. The baggage car took fire and burned, but the fire was confined to it by the exertions of the train men and passengers. One passenger was dangerously hurt and others were bruised considerably.

On the morning of the 27th, at 2 o'clock, near Bellton, W. Va., 35 miles west of Cumberland, an east-bound mail train on the Baltimore & Ohio Railroad ran into the rear of an east-bound express, which a broken axle had made much behind time, had been taken in tow by a mail train, and was halted for want of steam. The shock telescoped the two rear passenger cars and they caught fire. Three passengers were injured. The two cars were entirely burned, but the passengers were all saved from them. The engineman of the stalled train signaled for a flagman to go to the rear, but the brakeman misunderstood the signal and put on brakes at first, and so was delayed until it was too late.

On the afternoon of the 27th, a freight train on the Seaboard & Roanoke Railroad was thrown from the track near Boykin's Depot, Va., blocking the road six or eight hours.

On the morning of the 28th, the mail and baggage car and two coaches of a south-bound mixed train on the St. Cloud line of the St. Paul & Pacific Railroad were thrown from the track by a broken axle about ten miles south of St. Cloud, Minn., the baggage car rolling quite over, injuring the baggagemaster slightly. The axle broken was under a freight car loaded with oats, and a wheel fell off and slid under the forward truck of the mail car, but caught and tore off the rear truck, which in turn tumbled the baggage car over.

On the morning of the 28th, as a freight train was passing Ellerslie, on the Philadelphia, Wilmington & Baltimore Rail road, a driving-wheel tire broke, and the engine was thrown from the track and slid down a low bank into the ditch. The train was running very slowly at the time, and very little damage was done.

On the 28th, the baggage car and two coaches of a passenger train on the St. Paul & Sioux City Railroad were thrown from the track by a broken rail near Lincoln Station, Minn.

On the afternoon of the 28th, on the Vermont Central Railroad, a passenger train ran into the rear of a freight train at South Royalton, Vt., breaking up several freight cars, and the forward part of the locomotive and the baggage car of the passenger train.

On the afternoon of the 28th, the engine and one car of a n

extra freight train on the Philadelphia, Wilmington & Baltimore Railroad ran off the track at Trainor's Siding, near Linnwood, blocking the track some hours.

On the evening of the 28th, about 8 o'clock, a west-bound express train on the Erie Railway ran into an east-bound coal train from Weehawken, about a mile west of the Bergen tunnel, demolishing five cars of the coal train, and throwing the first of the two locomotives drawing the express upon its side in a deep cutting. The coal train was endeavoring to switch off at the time, in order to clear the track for the express.

On the night of the 29th, near Logansport, Ind., on the Toledo, Wabash & Western Railway, there was a collision between two freight trains by which a brakeman was killed and the engines and several cars badly wrecked. It is reported that the cause was the failure of a telegraph operator to deliver orders.

On the morning of the 30th, at Barnsville, W. Va., on the Baltimore & Ohio Railroad, an axle of the locomotive of a west-bound express train broke, throwing the engine from the track.

On the afternoon of the 30th, a south-bound train on the Boston, Concord & Montreal Railroad left the main track and ran through a switch and into a train standing on a side track, damaging the engine and three cars. It is said that the switch broke when the locomotive struck it and threw the train upon the side track.

Early in the morning of the 31st, in the yard at Indianapolis, there was a collision between a freight train of the Indianapolis and St. Louis Railroad and a passenger car full of passengers which was being transferred from the Indianapolis, Cincinnati & Lafayette to the Indianapolis, Bloomington & Western track. The coach was thrown from the track and down an embankment 10 or 12 feet high, upon its side, in a little stream. Three passengers were badly hurt.

On the morning of the 31st, a shifting engine on the Morris & Essex Division of the Delaware, Lackawanna & Western Railroad was thrown from the track at the west end of Bergen Tunnel by a broken rail, causing considerable delay to passenger trains, but very little damage to the engine.

On the morning of the 31st, a parallel rod of a locomotive on a west-bound passenger train on the Central Railroad of New Jersey broke, went through the bottom of the cab and threw the fireman forward upon the boiler, but without hurting him much.

On the morning of the 31st, near Moscow, Ky., on the Mobile & Ohio Railroad, the engine of a north-bound passenger train was thrown from the track by an iron rail which some one had laid across the track.

On the 31st, near Cuttingsville, Vt., on the Rutland Division of the Vermont Central Railroad, in passing over the frog at a switch, all the cars of a mail train left the track, and, the Rutland *Herald* says, "if it had not been for the Miller platforms and couplings a serious smash-up might have occurred." It is supposed that the joint of the frog was broken off under the locomotive.

On the afternoon of the 31st, at Burlington, Iowa, on the Burlington, Cedar Rapids & Minnesota Railroad, as a switching engine was backing up the track it met another locomotive coming down. The engineman of the switching engine reversed, closed the throttle and jumped. When they struck, this engine's throttle flew wide open and it started down the track at a fearful speed, and after running a little distance flew from the track into a pile of timber and was badly wrecked. At the end of the track, which it would soon have reached had it not left the track, were two cars full of passengers.

On the night of the 31st, on the Eastern Railroad, at Saco, Maine, the engine broke away from the Pullman train, and, stopping too quickly, was struck so heavily by the cars as to disable it.

Some time in the month, a freight train on the Allegheny Valley Railroad, at Foster, in backing up to take three cars on a siding which were to be taken on its train, a freight engine struck them with such force as to drive them against the bumper of the siding and cause a car to leak. In returning to the main track the oil from this car took fire from some coals dropped from the engine and was in a blaze in a moment. The brakeman, with great courage and presence of mind, uncoupled the car and set the brake, before jumping, and thus probably saved the other two cars, the station and other buildings.

Here we have a total of 112 accidents to trains occurring during the month, 16 of which caused death, and 28 other injury to persons. Therefore 68 of the whole number, or about three-fifths, caused injury to property only. The total number killed by train accidents during the month was 42, and the total number injured 133.

The accidents may be classified as to their nature and causes as follows:

Derailments.		
Unexplained	25	
By broken rail	18	
By misplaced switch	6	
By broken axle	3	
By malicious obstruction	3	
Cattle on track	3	
Broken switch-bar	2	
Broken truck	2	
By defective rail	2	
Accidental obstruction	1	
Broken driving-wheel tire	1	
Fallen brake beam	1	67
Collisions.		
Rear collisions	23	
Head collisions	9	
Crossing collisions	2	
Unknown	7	41
Boiler explosion	1	
Broken bridge	1	
Broken parallel rod	1	
Obstruction (fallen rock)	1	
Total		112

This is the largest number of accidents we have yet had to report for any single month, and includes, we believe, a considerably larger number of fatal casualties, though the great slaughter by the accident on the Grand Trunk in June gives that month pre-eminence in the number of deaths. For the eleven months ending with December (we began our reports with February) our record stands as follows:

	No. of Accidents.	Killed.	Injured.
February	21	18	128
March	37	3	67
April	22	13	32
May	27	9	33
June	44	63	114
July	31	35	66
August	63	15	49
September	71	34	104
October	90	29	102
November	103	37	114
December	112	42	133
Totals	611	288	942

As we have remarked frequently, the comparatively small number of accidents reported for the earlier months of the year is doubtless in large part owing to incomplete information.

But the large increase shown since summer is doubtless in accordance with the facts, the dangers in working a railroad being much greater in winter weather, when deep snows occasion great irregularity—the great cause of collisions—and, worst of all, the frost heaves the track, makes a level and elastic road uneven and as rigid as rock; and when it is very difficult to make repairs properly, to say nothing of the real or supposed effect of severe cold on the strength of iron itself. If we take the average of the reports for the last half of the year (as those during which the reports have equal completeness), we will find that the average number of accidents was 78 per month, and the average fatality 30 killed and 95 injured.

An examination of the table of accidents classified according to their nature and causes may prove suggestive. No less than 28 of those for which causes were reported were the result of the breaking of parts of the road or rolling stock, 18 are charged to broken rails alone, two to broken switch bars, one to a broken bridge and seven to the breaking of parts of rolling stock, while two others are charged to defective rails, among which we count the most serious one of the month, that on the Buffalo, Corry & Pittsburgh, where the immediate cause seems to have been the breaking of a flange, but the primary cause the defective rail, which was so low at one end that the perfect rail adjoining stood up an inch or so, and readily broke the flange as it passed the joint. Four of the accidents were caused maliciously, and one of these resulted in a fatal injury. Besides the six derailments two collisions were caused by a misplaced switch.

Hereafter we will try to present some general analysis of the accidents thus far reported, with the purpose of indicating the relative frequency of different kinds of casualties, and the causes which seem most productive of accidents.

We find that this record requires a great deal of room much needed for other purposes, as also an expenditure of time and care which could be expended with advantage elsewhere in our columns, but the assurances we receive from those whom we trust most of the value of this record, which is, we believe, the only one made for the entire country, decides us to continue it, though it may become necessary to give it in a more condensed form. We hope, however, that greater care in working and improvements in the condition of permanent way and rolling stock and in discipline may soon make this record so short that it will not continue a burden to our pages. We are sure that a very large proportion and probably most of the accidents we report were avoidable, notwithstanding intense frosts and deep snows. If the reports which we give shall afford material for a more intelligent study of the causes of accidents, by affording instances sufficient for safe deductions, and thus indirectly result in some reduction in the number and fatality of accidents, the space and time will have been well bestowed.

And here we may say that we do not give, and we do not expect to be able to, reports of *all* accidents. Most of our information comes from the newspapers, and very frequently the slighter accidents are never reported. And, too, we cannot of course vouch for the accuracy of these reports: we simply do the best we can with the material at our command. It is very difficult frequently to arrive at the truth concerning a railroad accident even with all the witnesses and the machinery of a court of justice trained to ascertain facts. On the whole, however, our record is doubtless substantially correct in its aggregate, though not in all its details.

American Society of Civil Engineers.

A regular meeting of this Society was held at its rooms in New York, January 8. A paper by Charles B. Richards, M. E., of Hartford, Conn., recording "Experiments on the Resistance of Stones to Crushing" was read.

The specimens tested were old and dry samples, well selected, of various American building stones, worked into 1 in. and 1½ in. cubes, with flat and smooth faces.

The testing machine used was built after a long experience with two smaller and similar machines. It is arranged to weigh the strains upon a sensitive platform scale of 50 tons capacity, and is well adapted to quickly give accurate results.

The specimens were crushed between the plane faces of two hardened steel hemispheres, the curved portions of which were seated in corresponding cavities of steel blocks fixed in the machine. Single thicknesses of "lace" leather were interposed between the stones and metal surfaces; thus the pressure was uniformly distributed. It was in all cases applied to the faces of the cubes parallel to the natural bed of the stone, and carefully increased to rupture by pouring shot into the hollow weight by which the strain was caused.

Tables were presented, giving the minimum, mean and maximum resistance to crushing per square inch of the specimens tested.

Sixteen specimens of *granite*, from six quarries, gave from 3,620 to 15,622 pounds minimum, 9,838 to 18,778 pounds maximum strength; 14 specimens of *sand-stone* from three quarries gave from 5,806 pounds minimum, and 8,956 to 10,928 pounds maximum strength; and 10 specimens of *white marble* from three quarries, gave from 3,905 to 12,917 minimum, and 5,676 and 13,972 pounds maximum strength—each being 1 inch cubes.

The specimens failed by breaking up into slender prisms and pyramids with axes normal to the pressure.

A brief paper by F. Collingwood, C. E., of New York, upon "Rock Drilling," was also read.

In it was stated that a percussive steam drill, with 3-inch cylinder and 6 inches stroke, making 300 to 375 strokes per minute, would drill in the coarse gneiss rock, common on New York Island, 1⅛in. holes 3 inches, 1¼in. holes 4½ inches, and 1in. holes 5 inches per minute.

Joseph P. Davis, C. E., of Boston, Mass., compared the late Chicago and Boston fires, and suggested a question for discussion, and one on which information is much needed, namely: "Fires and their Management; the Best Appliances and Methods for Putting them Out."

Upon motion of M. N. Forney, M. E., of New York, a committee consisting of Messrs. Ashbel Welch, of Lambertsville, N. J.; John Griffin, of Phoenixville, Pa.; Max Hjortsberg, of Chicago, Ill., and two others to be named by the Chairman, were appointed to make an investigation by means of a circular of inquiry sent to each member of the Society, and by such other methods as the committee may choose to adopt, to determine the following points:

1. The best form for standard rail sections for the railroads of this country.
2. The proportion which the weight of rails should bear to the maximum loads carried on a single pair of wheels of locomotives or cars.
3. The best method of manufacturing and testing rails.
4. The endurance, or, as it is called, the "life" of rails.
5. The causes of the breaking of rails while in use, and the most effective way of preventing it.

The Committee to report the results of their investigations at the next annual convention of the Society.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

—At the annual meeting of the Philadelphia & Trenton Railroad Company the following officers and directors were elected: President, J. Edgar Thomson; Directors, Josiah Bacon, Wistar Morris, Joseph B. Myers, John M. Kennedy, Edward C. Knight, Samuel T. Bodine, Thomas A. Scott, Strickland Kneass, Edmund Smith, George B. Roberts, Geo. M. Dorrance; Floyd H. White, Secretary and Treasurer. This is almost entirely a new board, only Messrs. Dorrance and Roberts of the old board remaining. Most of the new directors are officers of the Pennsylvania Railroad Company, which now leases the road.

—The Pennsylvania & New York Canal & Railroad Company has chosen the following officers for the ensuing year: President, Robert H. Sayre; Directors, Asa Packer, Wm. W. Longstreth, Charles Hartshorne, John J. Taylor, Garrett B. Linderman, Robert Lockhart, Victor E. Piollet, Robert A. Packer, J. Henry Swoyer, John W. Hollenback, William H. Sayre, Joseph Wharton. Mr. Wharton takes the place of C. F Welles; the others are re-elected.

—The stockholders of the Pittsburgh, Virginia & Charleston Railroad Company held their annual meeting at Pittsburgh, January 13, and chose the following officers and directors: President, B. F. Jones; Vice-President, John Scott; Directors, W. W. Martin, Joseph Walton, Wm. J. Howard, Henry B. Hays, J. C. Fischer, Alex. Patton; Treasurer and Secretary, D. P. Corwind; General Freight and Passenger Agent, W. J. Rose; Chief Engineer and General Superintendent, John M. Byers; Assistant Superintendent, John F. Scott.

—At the annual meeting of the Delaware & Pennsylvania Railroad Company, at Delaware City, Del., January 13, the following directors were chosen: William D. Clark, Geo. B. Money, Wm. Reybold, Delaware City; S. Minot Curtis, John Pilling, Newark; Strickland Kneass, Edmund Smith, George B. Roberts and Samuel T. Bodine, Philadelphia. The board of directors chose the following officers: Wm. D. Clark, President; Geo. B. Money, Secretary, and John T. Williamson, Treasurer.

—The stockholders of the Des Moines, Indianola & Winterset Railroad Company held their annual meeting at Des Moines, Iowa, January 15, and elected the following directors: B. F. Allen, F. R. West, R. L. Tidrick, Dan. Van Pelt, B. F. Roberts, Ed. R. Clapp, H. F. Royce. The last four are new directors. At a subsequent meeting of the directors the following officers of the road were elected: President, B. F. Allen; Vice-President and Treasurer, F. R. West; Secretary, R. L. Tidrick.

—At the annual meeting of the Mansfield, Coldwater & Lake Michigan Railroad Company, at Mansfield, O., January 6, the following directors were chosen: W. S. Hickox, H. H. Sturgess, J. H. Cook and H. Colby, of Mansfield, O.; H. C. Lewis and F. V. Smith, of Coldwater, Mich.; V. P. Collier, of Battle Creek, Mich.; Z. Fisk, of Allegan, Mich.; H. J. Jewett, of Columbus, O.; A. F. Smith, of Cleveland, O.; Wager Swayne, of Toledo, O.; D. D. Hughes and F. A. Gorham, of Grand Rapids, O. The directors organized by electing W. S Hickox as President; H. C. Lewis, Vice-President; H. C. Hedges, Secretary.

—At the annual meeting of the Peninsular Railroad Company of Michigan, at Battle Creek, Mich., January 16, the following directors were elected: Joseph M. Ward, Edwin C. Nichols, Leonidas D. Dibble, Battle Creek, Mich.; Elisha Shepard, Charlotte, Mich.; Sylvador T. Read, Cassopolis, Mich.; Wm. Miller, South Bend, Ind.; Samuel I. Anthony, Valparaiso, Ind.; Wm. E. Henry, Joliet, Ill.; Martin S. Brackett, Bellevue, Mich. The election of officers was deferred until some future meeting of the directors. The meeting was unanimous. Messrs. E. C. Nichols, E. Shepard and W. E. Henry are new directors, replacing W. Wallace, M. Butterworth and C. V. Dyer.

—The stockholders of the Union Stock Yard Company of Cincinnati have re-elected the old board of directors, as follows: J. L. Keck, W. J. Lippincott, Charles Kahn, Jr., John Morrison and M. S. Forbus.

—At the annual meeting of the Central Railroad & Banking Company of Georgia, at Savannah, Ga., January 13, the old board of directors was re-elected, as follows: William M. Wadley, Andrew Lowe, John R. Wilder, George W. Wylly, G. W. Anderson, J. F. Gilmer, A. S. Hartridge and John Cunningham, of Savannah, Ga.; W. B. Johnston, of Macon, Ga.

—The following gentlemen have been chosen directors of the New York Elevated Railway Company: John F. Tracy, Wm. L. Scott, David Dows, Danforth N. Barney, Francis H. Tows, Edward C. Delavan and George H. Marvin.

—At the annual meeting of the Junction & Breakwater Railroad Company, at Milford, Del., January 13, the following directors were elected: G. K. Reed, T. Baumgardner, J. A. Sheaff and J. M. Boney, of Pennsylvania; and C. S. Watson,

C. C. Stockley, Benj. J. Burton, Harbeson Hickman and E. D. Hitchens, of Delaware. The following officers were elected: President, G. K. Reed; Superintendent, J. A. Sheaff; Treasurer, W. S. Vauls; Secretary, J. Y. Foulk.

—Mr. P. A. Marsh has been appointed Train Dispatcher at Peoria on the Peoria & Rock Island Railroad.

—The board of directors of the Jefferson City, Lebanon & Southwestern Railroad Company has chosen the following officers: J. Ed. Belch, President; H. Clay Ewing, Vice-President; Phil. E. Chappell, Treasurer; E. L. Edwards, Attorney; and C. J. Corwin, Secretary.

—Mr. W. G. Brownson having resigned his position as Superintendent of the Pittsburgh & Columbus Division of the Pittsburgh, Cincinnati & St. Louis Railway, the division will be divided into two jurisdictions. Mr. Hugh Pitcairn has been appointed Superintendent of the Eastern Division, from Pittsburgh to Denison, O., and Mr. J. H. Barrett of the Western Division, from Denison to Columbus.

—Mr. J. W. Bishop, late Chief Engineer, has been appointed General Manager of the St. Paul & Sioux City Railroad. Mr. John F. Lincoln remains Superintendent of the road, and Mr. J. B. Bennett has been appointed Assistant Superintendent, with headquarters at Sioux City. Captain Thomas P. Gere, late Assistant Engineer has been appointed Chief Engineer.

—Mr. C. F. Young, General Superintendent of the Delaware & Hudson Canal Company, will hereafter be known as General Manager. Mr. I. V. Baker, heretofore Superintendent of the Rensselaer & Saratoga Railroad Department of the Delaware & Hudson Canal Company, will be Superintendent in charge and will have the general supervision of the interests of the company upon the lakes, including the railroads controlled by the company, or that are in construction on the west shore of Lake Champlain. Mr. H. A. Fonda, heretofore Superintendent of the Albany & Susquehanna Railroad Department of this company, will hereafter have charge, as Superintendent of Transportation, of the Albany & Susquehanna and the Rensselaer & Saratoga railroads, which will be operated as one department. Mr. C. W. Went will have charge or all track maintenance and repairs, with the title of Chief Engineer.

—At the annual meeting of the Woodstock Railroad Company, at Woodstock, Vt., January 15, the old board of directors was re-elected, as follows: Albert G. Dewey, Frederick Billings, Prosper Merrill, Charles Daua, Francis W. Clarke, Lewis Pratt, Frank N. Billings, of Woodstock; Charles S. Raymond, of Bridgewater; Otis Chamberlain, of Pomfret. At a subsequent meeting of the directors the following officers were elected: President, Albert G. Dewey; Clerk, Luther O. Greene; Treasurer, Francis W. Clarke. Mr. Dewey succeeds Prosper Merrill as President; the other officers are re-elected.

—At the annual meeting of the Montpelier & Wells River Railroad Company, at Montpelier, Vt., January 14, the following board of directors was chosen: James G. French, Joel Foster, Jr., Charles H. Heath, James W. Brock, Montpelier; S. C. Shurtleff, Plainfield; Geo. Wooster, Marshfield; I. N. Hall, Groton; George B. Fessenden, Wells River; C. M. Weeks, Woodsville. At a subsequent meeting of the directors a temporary organization of the board was made, Hon. Charles H. Heath, of Montpelier, being elected President, *pro tem.*, and Joel Foster, Jr., Clerk. Messrs. French, Brock, Shurtleff, Fessenden and Weeks are new directors.

—At the annual meeting of the North Pennsylvania Railroad Company, Franklin Comly was re-elected President, and John Jordan, Jr., J. Gillingham Fell, William C. Ludwig, Ellwood Shannon, Edward C. Knight, Alfred Hunt, William C. Kent, Thomas Smith, Ario Pardee and James H. Stevenson, all of Philadelphia, were chosen directors. Messrs. Pardee and Stevenson are now directors, replacing C. W. Wharton and Edward Roberts.

—At the annual meeting of the Philadelphia & Baltimore Central Railroad Company, at Oxford, Pa., January 13, Henry Wood was chosen President, and S. M. Felton, Isaac Hinckley, R. H. Lamborn, David Woelpper, Aaron Baker, Milton Conard, Joseph Bringhurst, G. D. Armstrong, Samuel Dickey, Jacob Tome, Thomas Donaldson, Edwin Haines, directors. These are all re-elections.

—A circular from the President of the Canada Southern Railway Company announces that Mr. F. N. Finney, Chief Engineer of the road, has been appointed Superintendent of the road. Mr. J. H. Sheldon has been appointed Assistant Superintendent, and Mr. C. E. Benton, Master Mechanic, both with headquarters at St. Thomas, Ontario.

—Mr. William La Suer has been appointed Master Mechanic of the Flushing & North Side Railroad, in place of George H. Griggs, resigned. Mr. La Suer has been foreman in the shops at College Point, N. Y.

—At the annual meeting of the Philadelphia, Wilmington & Baltimore Railroad Company, at Wilmington, Del., January 13, the old board of directors was re-elected, as follows: Isaac Hinckley, Samuel M. Felton, William Sellers, Samuel Welsh, of Philadelphia; Jesse Lane, Joseph Bringhurst, Samuel Harlan, Jr., of Wilmington, Del.; Thomas Whitridge, Thomas Kelso, Thomas Donaldson, S. M. Shoemaker, Enoch Pratt, of Baltimore; William Minot, Jr., Nathaniel Thayer, of Boston; and Jacob Tome, of Port Deposit, Md. Isaac Hinckley was elected President; H. F. Kenney, General Superintendent, and Alfred Horner, Secretary and Treasurer.

—At the annual meeting of the stockholders of the Delaware Railroad Company, at Dover, Del., January 9, the following board of directors was elected: Samuel M. Felton, Isaac Hinckley, of Philadelphia; Andrew C. Gray, of New Castle, Del.; Joseph Bringhurst, Charles Warner, Jesse Sharpe, of Wilmington; Isaac Jump, Manlove Hayes, of Dover, Del.; H. B. Fiddeman, Alexander Johnson, William H. Ross, of Seaford, Del.; Albert Curry and J. Turpin Moore, of Laurel, Del. At a meeting of the directors, S. M. Felton was chosen President, and Manlove Hayes Secretary and Treasurer.

—The West Reading Railroad Company has chosen the following officers for the ensuing year: President, Franklin B. Gowen; Directors, R. B. Cabeen, J. B. Lippincott, J. L. Stichter, H. H. Muhlenberg, G. D. Stitzel, J. E. Wootten; Secretary and Treasurer, D. E. Stout.

—The Berks County Railroad Company has chosen George Leach, J. V. Craig, H. S. Eckert, Simon Seyfert, Hugh E. Steele, C. E. Pennock, William S. Hilles and Edward Betts, directors for the ensuing year. Henry Bushong was re-elected President and F. C. Smink Secretary and Treasurer.

—The election of officers of the Montrose Railroad Company, of Pennsylvania, January 13, resulted as follows: President, James J. Blakeslee, of Mauch Chunk; Treasurer, Wm. H. Cooper; Secretary, C. L. Brown, of Montrose; Chief Engineer, F. Ausart, Jr., Tunkhannock; Directors, Messrs. Samuel H. Sayre, A. Lathrop, C. M. Gere and William Mulford, of Montrose; S. Tyler, of Dimock; H. K. Sherman, D. Thomas and B. F. Blakeslee, of Springville; G. E. Palen, S. Stark, of Tunkhannock; R. Klotz, C. O. Skeer, of Mauch Chunk.

—Hugh E. Steele has been re-elected President; William S. Hilles, Secretary and Treasurer; C. S. Stoltz, Engineer and General Superintendent, of the Wilmington & Reading Railroad Company.

—In accordance with a resolution adopted at the recent meeting of the stockholders authorizing the appointment of two vice-presidents, the board of managers of the Philadelphia & Reading Railroad Company has chosen J. W. Jones First Vice-President and G. A. Nicholls Second Vice-President. Mr. Jones has been Secretary of the company and Mr. Nicholls Superintendent, and both have been in the service of the company for a long time. Mr. David J. Brown, late Comptroller, was chosen Secretary in place of Mr. Jones.

—The annual meeting of the stockholders of the Utica, Clinton & Binghamton Railroad Company was held in Utica, N.Y., January 14, and the following directors chosen: O. S. Williams, John Thorn, Isaac Maynard, Henry Hopson, H. S. Armstrong, Robert S. Williams, John E. Elliott, Andrew W. Mills, David M. Miner, Thomas W. Forward, N. W. Parker, Geo. B. Phelps, Alex. Holland. The board elected the following officers: O. S. Williams, President; Isaac Maynard, Vice-President; J. W. Church, Secretary; Messrs. O. S. Williams, Maynard and Mills, Executive Committee. These are all re-elections.

—The annual meeting of the Dayton & Union Railroad Company was held at Dayton, O., January 7, and the following directors elected: Messrs. H. B. Hurlbut, Oscar Townsend, Wm. Collins, E. S. Flint and T. P. Handy, of Cleveland; James McDaniel, John H. Achey, Geo. W. Rogers, of Dayton, and J. R. Knox, of Greenville. The board afterwards elected the following officers: President, H. B. Hurlbut, of Cleveland; Vice-President, James McDaniel, of Dayton; Secretary, J. Riley Knox, of Greenville; Auditor, John L. Miller, of Dayton; Superintendent, C. C. Gale, of Indianapolis; Executive Committee, H. B. Hurlbut, J. McDaniel, J. H. Achey and C. C. Gale. Messrs. Hurlbut, Townsend, Collins, Flint and Handy are new directors, replacing Messrs. Stimson, Bayard, Darrow, Gray and Studebaker. Mr. Hurlbut succeeds Robert Bayard as President.

—The stockholders of the American Dock & Improvement Company have elected John Taylor Johnston, Samuel Knox, H. P. Baldwin, Benjamin Williamson, F. T. Frelinghuysen, Sidney Dillon and Archibald K. Brown directors. John T. Johnston was elected President and A. K. Brown Secretary. Messrs. Johnston, Knox, Baldwin, Williamson, Frelinghuysen and Dillon are officers of the New Jersey Central Company. This is the company which constructed the docks at Communipaw, now used by the New Jersey Central road.

—C. G. Eddy is made General Agent of the Chicago & Northwestern Railway at Council Bluffs, in place of W. A. Carpenter, promoted to be Assistant General Freight Agent.

—Mr. W. A. Carpenter, late General Agent of the Chicago & Northwestern Railway at Council Bluffs, has been appointed Assistant General Freight Agent of the road, with office at Chicago. Mr. Carpenter will have general charge of the freight business on the Galena and Iowa divisions.

—W. S. Mellen, lately Agent at Fort Howard of the Chicago & Northwestern Railway, has accepted an appointment as General Freight and Ticket Agent of the new Green Bay & Lake Pepin Railroad, and Lewis M. Tyler succeeds Mr. Mellen as Agent at Fort Howard.

—Mr. C. A. Swineford, recently appointed for the Wisconsin and Milwaukee divisions of the Chicago & Northwestern Railway, in place of J. H. Hall, resigned, has served as brakeman, conductor and assistant train dispatcher.

—Henry Schlacks, recently foreman of the Rock Island shops in Chicago, has been appointed Master Mechanic of the Chicago shops of the Illinois Central Railroad. He was formerly an apprentice in these shops.

—Capt. D. W. Wellman has resigned his position as Chief Engineer of the Wisconsin Central Railroad. He gave a supper to the members of the engineer corps of the company just before leaving, when they surprised him by a gift of a fine set of silver. Captain Wellman is now living at Oshkosh, Wis.

—At the annual meeting of the Chester Valley Railroad Company, held January 13, Franklin B. Gowen, Coffin Colket, Chas. E. Smith, H. P. McKean, R. B. Cabeen and A. E. Borie, of Philadelphia, and W. H. Holstein, of Bridgeport, Pa., were chosen directors. Mr. Gowen takes the place of John Tucker, the rest of the board being re-elected. John F. Gilpin was re-elected President of the company.

—At the annual meeting of the Philadelphia & Reading Railroad Company, held in Philadelphia January 13, the old officers were unanimously re-elected, as follows: President, Franklin B. Gowen; H. Pratt McKean, A. E. Borie, R. B. Cabeen, J. B. Lippincott, John Ashhurst and Charles E. Smith, all of Philadelphia, Managers; Samuel Bradford, Treasurer; J. W. Jones, Secretary.

—Charles Paine, now General Superintendent of the Lake Shore & Michigan Southern Railway, having resigned the presidency of the Civil Engineer's Club of the Northwest, on account of his removal to Cleveland, E. S. Chesbrough, City Engineer of Chicago, has been chosen to fill the vacancy.

—A meeting of stockholders of the Chicago, Pekin & Southwestern Railroad Company was held at Streator, Ill., on the 12th instant, where the following board of directors was chosen: F. E. Hinckley, A. B. Meeker, J. L. Stark, P. B. Shumway, Chicago; F. Plumb, S. Plumb, Jay Baker, A. E. Eyler, of Streator, and B. F. Harris, J. W. Daugherty and W. P. Sisson, of Washington, Ill. The officers elected were as follows: F. E. Hinckley, President; A. B. Meeker, Vice-President; F. Plumb, Secretary; S. Plumb, Treasurer; N. J. T. Dana, Superintendent; W. P. Sisson, Assistant Superintendent.

—General Robert Ransom, of North Carolina, has been appointed General Superintendent of the Florida Railroad.

—Mr. J. T. Furber has been appointed Superintendent of the Boston & Maine Railroad in place of William Merritt, resigned. Mr. Furber has been for a long time General Freight Agent of the road.

—Mr. Thomas Flesher has been appointed Superintendent of the Toledo Division of the Lake Shore & Michigan Southern Railway, to succeed P. D. Cooper, promoted. Mr. Flesher has been Train Dispatcher on the Buffalo Division.

—Mr. P. D. Cooper, late Superintendent of the Toledo Division, has been appointed Assistant General Superintendent of the Lake Shore & Michigan Southern Railway, with his office in the Union Passenger Depot at Cleveland. He will have charge of the general movement of the traffic, the dispatch of trains, the distribution of cars to the several divisions and to the connecting roads.

—At a meeting held at the office of the President of the Union Stock Yards & Transit Company, No. 102 Michigan avenue, Chicago, the following directors were elected for the ensuing year: J. F. Joy, Detroit; J. N. McCullough, Pittsburgh; J. H. Devereux, Cleveland; J. M. Walker, John Newell, H. E. Sargent, M. Hughitt, J. C. McMullin, Chicago. The following were elected officers of the yards: J. M. Walker, President; John B. Sherman, Superintendent; George T. Williams, Secretary.

—At the annual meeting of the Wilmington & Reading Railroad Company, at Coatesville, Pa., January 7, the following directors were chosen: Hugh E. Steele, Edward Brooke, of Birdsboro, Pa.; Hiester Clymer, of Reading, Pa.; Charles Huston, C. E. Pennock, J. S. Pennock, S. B. Worth, of Coatesville, Pa.; Edward Betts, Joseph Tatnall, I. Du Pont, Victor Du Pont, E. C. Stotzenburg, G. W. Bush, of Wilmington, Del. These are all re-elected.

—The Chester Valley Railroad Company has chosen Franklin B. Gowen, Coffin Colket, Charles E. Smith, H. P. McKean, R. B. Cabeen, A. E. Borie and William H. Holstein, directors for the ensuing year. Mr. Gowen takes the place of John Tucker, the rest being re-elected. The road is leased to the Philadelphia & Reading Company.

TRAFFIC AND EARNINGS.

—The earnings of the Kansas Pacific Railway for the first week in January were: from passengers, $15,723.05; freight, $16,928.57; mails, $2,055.31; total, $34,706.93. Of this amount, $3,285.21 was for transportation of troops, mails and government freight.

—The earnings of the St. Louis & Southeastern Railway (consolidated) for the first week in January were $17,645. The ice blockade still prevailing in the Ohio River interfered very much with freight traffic.

—The coal traffic of the Belvidere Division of the Pennsylvania Railroad (Belvidere Delaware Railroad) for the year 1872 was: through, 877,613 tons; way, 87,940 tons; total, 965,553 tons. Of this, 649,614 tons was for tide shipment, 276,700 tons from Trenton and 372,914 tons from South Amboy.

—The receipts of the Grand Trunk Railway of Canada for the week ending December 28 were: 1872, £21,800; 1871, £34,700; decrease, £12,900, or 37 per cent.

—The receipts of the Great Western Railway of Canada for the week ending December 27 were: 1872, £14,948; 1871, £19,799; decrease, £4,851, or 24½ per cent.

—The earnings and expenses of the Central Railroad of New Jersey for the year are as follows:

	1872.	1871.
Gross receipts	$7,213 108 63	$6,841,379 19
Expenses	4,084,291 98	3,706,144 48
Net earnings	$3,128,816 65	$3,135,234 71

Increase in gross receipts, $371,729.14, or 5 7-16 per cent. Decrease in net earnings, $6,418.06, or 0 1-5 per cent. The decrease in net earnings was caused by the low rates obtained during the year for coal freights. The expenses in 1872 were 56⅔ per cent. of the gross receipts; in 1871, 54 3-16 per cent.

—The following is a statement of the shipments of coal from the Cumberland coal region for the year just ended:

	1872.	1871.
By Baltimore & Ohio Railroad	1,517,347	1,494,814
By Chesapeake & Ohio Canal	816,103	850,339
By Pennsylvania Railroad	22,021	.....
Total	2,355,471	2,345 153

Increase in 1872, 10,318 tons, or 0½ per cent. It will be seen that there was a considerable falling off in the canal trade, the increase being entirely in the railroad traffic. The Bedford Division of the Pennsylvania road, by which it has access to the Cumberland region, was not opened until late in the season. The coal was derived from the following districts:

Cumberland Railroad and branches	1,918,514
Cumberland Branch	280,152
Virginia Coal & Iron Company	35,441
Hampton & Baltimore Company	121,364
Total	2,355,471

The tonnage hauled by the Baltimore & Ohio alone was sufficient to give it about 500 car-loads daily.

—The coal tonnage of the Central Railroad of New Jersey, for the year 1872, were: from Lehigh, 1,538,590 tons; from Lackawanna, 689,626 tons; total, 2,228,216 tons. The total shipments for 1871 were 1,877,064 tons, showing an increase last year of 351,152 tons, or 18⅞ per cent. The coal was consigned as follows: to Elizabethport—Lehigh, 546,671 tons; Lackawanna, 673,833 tons; total, 1,220,504 tons: to Port Johnston—Lehigh, 883,599 tons: to points on line of road—Lehigh, 108,321 tons; Lackawanna, 15,793 tons; total, 124,114 tons.

—The earnings of the Denver & Rio Grande Railway for the year 1872 were: from passengers, $134,963.90; freight, $172,902.17; total, $307,866.07. The road is now 155 miles long, but its average length for the year was about 100 miles, and the income of about $3,000 a mile is a very good showing for a new road through a new country.

—The following additional reports of earnings for December have been received:

	1872.	1871.	Increase.	Decrease.	Pr.ct.
Kansas Pacific	$323,241	$310,197	$13.044	....	6⅔
Lake Shore & Mich. So.	1,433,931	1,235,285	198,646	....	16⅔
Michigan Central	576,783	507,050	69.733	....	13¾
Missouri, Kan. & Texas	200,228	105 244	94,984	....	90
Tol., Peoria & Warsaw	90 856	99,804	....	8,948	9
Tol., Wabash & West'n	492,335	516,934	....	24,299	4¾

And for the year:

	1872.	1871.	Increase.	P.ct.
Lake Shore & Mich. So.	$17,537,734	$14,979.975	$2,557,759	17⅓
Michigan Central	6,994.124	5,984,907	1,009,217	16⅞
Missouri, Kansas & Texas	1,887,462	997,293	890,169	89¼
Toledo, Peoria & Warsaw	1,270,216	1.072.948	197,268	18⅜
Toledo, Wabash & West'n	5,968,317	5,736,662	231,655	4

—The earnings of the Knox & Lincoln Railroad for the ten months ending August 31, 1872, were $92,611.11. The operating expenses were $51,639.03, or 55⅞ per cent. of the receipts; and the net earnings were $40,972.08. The road is 48½ miles long, from Bath to Rockland, Me., and the gross earnings are at the rate of $2,291 per mile per year.

PERSONAL.

—Mr. George L. Walker has resigned his position as Train Dispatcher of the Rockford, Rock Island & St. Louis Railroad, to accept a position on the Union Pacific.

—Mr. Warder Comming, Chief Train Dispatcher and Superintendent of Telegraph of the Pacific Railroad of Missouri, has removed his office to Sedalia, Mo.

—Prof. W. J. McQuorn Rankine died of apoplexy at his residence in Glasgow, Scotland, December 24. He had been for some time in failing health, but no immediate danger had been anticipated, and his death was very sudden. It is difficult to over-estimate the magnitude of the loss which the scientific world has sustained. Professor Rankine was not a profuse writer, but his contributions to science are of the highest value. As a mathematician he was unsurpassed, and his contributions to thermodynamics alone would suffice to place him in the first rank among men of science. His works are written with extraordinary care and unusual clearness of expression, and are of the highest value to students. Professor Rankine has left a vacancy in the scientific world which will not soon be filled.

—Mr. J. H. Stewart, Superintendent of the Winona & St. Peter Railroad, received a carriage and team, valued at $1,200, as a New Year's gift from the employees of the road.

—Mr. Edward L. Du Barry, Superintendent of the Baltimore & Potomac Railroad, was recently presented with a handsome gold watch and chain by a number of the employees of the Northern Central road, of which Mr. Du Barry was formerly Assistant Superintendent.

Dr. Ely, President of the Mount Holly & Medford Railroad Company, died at Medford, N. J., January 16.

—Mr. William Merritt has resigned his position as Superintendent of the Boston & Maine Railroad. The Boston *Advertiser* says of his resignation:

"We cannot let the opportunity pass without a word of hearty recognition of his long, successful and laborious service. For eighteen years he has filled the place just vacated, during all of which time the constantly-growing business of the road has required his unwearied attention and more and more of his best thought. The prosperity of the road and its great popu-

larity afford evidences of the quality of the service he has given to it. We need not speak here of the courtesy which has marked his bearing toward all, and made his relations with the large body of employees of the road and with thousands of its patrons so genial and honorable."

OLD AND NEW ROADS.

Delaware, Lackawanna & Western—Morris & Essex Division.

The amendment to the charter of the Morris & Essex Company which is asked for from the New Jersey Legislature will, if passed, allow the company to make a new terminus for its road on the Hudson River and construct a new tunnel, or open cut, through Bergen Hill, and make other necessary changes in the line of its road between Newark and the Hudson River.

All the passenger trains now leave Easton, Pa., from the depot of the Lehigh Valley Railroad, instead of from the old depot at the foot of Fourth street.

Logansport, Crawfordsville & Southwestern.

The coupons of this company's first-mortgage gold bonds due February 1, will be paid on and after that date by the Financial Agents, Messrs. Jones & Schuyler, at No. 12 Pine street, New York.

Milwaukee, Lake Shore & Western.

The length of this part of the Northwestern Union Railroad, over which trains of the above company enter Milwaukee, is 3¾ miles, and the entire distance from the Milwaukee depot to Sheboygan is 52.8 miles. The company has 22 miles of grading completed between Sheboygan and Manitowoc, and was consolidated last May with the Appleton & New London Railroad, from Manitowoc west to Appleton, which it is now working. As we have noted heretofore, the Wisconsin Central is to work the entire line when it is completed. Joseph Vilas, of Sheboygan, is President, and H. G. H. Reed, Chief Engineer.

Quincy, Missouri & Pacific.

A correspondent writing from Quincy says that this road, though the last built of the roads leading to Quincy, appears to wish to be among the foremost in equipment. Its freight cars are of the heaviest pattern, its engines Manchester and Rogers' best, the coaches fitted with Miller platforms and the passenger equipment is now to be supplied with the Westinghouse brake with its latest improvements. The road is doing a very good business, both in freight and passengers, which is steadily increasing.

Saginaw & St. Clair.

Grading has been commenced near Vassar, Mich.

Atchison, Topeka & Santa Fe.

The surveys for the extension from the Kansas State line to Pueblo, Col., have been completed. The line as located crosses the Arkansas River 26 miles below Pueblo, at Graham's Ranch.

Central of New Jersey.

This company purposes to build a short loop line on the Lehigh & Susquehanna Division, crossing the Lehigh at Wheeler's Locks, a short distance below Allentown, Pa., running through that town and recrossing the river at the East Pennsylvania Junction. The road now runs on the north bank of the river.

Winona & St. Peter.

This road has been again snowed under, and was only cleared after several days' work. It is reported that several of the workmen on the road west of New Ulm were frozen to death.

St. Paul & Sioux City.

In common with all the other Minnesota railroads, this road suffered severely from the late storm, all through trains having been stopped for over a week.

Florida.

It is said that this company will commence soon to repair their road and put it in good order from Fernandina to Cedar Keys. Arrangements are also to be made for the renewal of the line of steamers between Fernandina and New York.

Kennebec & Wiscasset.

The town of China, Me., has voted to lend its credit to this company to the amount of $75,000.

Philadelphia & Reading.

The Reading (Pa.) *Eagle* says:

"Two gangs of workmen, one employed by the Philadelphia & Reading and the other by the Pennsylvania Railroad Company, are at work side by side on the west bank of the Susquehanna, opposite Marietta, grading along the proposed line of the new railroad, from that point to Hanover Junction. The cause of this unwonted activity in building railroads in mid winter is that the Reading Company is anxious to secure a route to the South over the new Hanover Branch & Susquehanna Railroad, while the Pennsylvania Company is not only anxious to prevent it, but is also desirous of making a connection along the York County bank of the river between Wrightsville and Middletown."

Jacksonville, Pensacola & Mobile.

The Jacksonville (Fla.) *Union*, of January 16, says:

"The extension of the Jacksonville, Pensacola & Mobile Railroad, west of the Quincy Depot to Chattahoochee, was sold on Monday, 7th inst., by the Sheriff of Gadsden County, for the sum of $70,000." This extension is about 20 miles long.

South Side of Long Island.

It is reported that a controlling interest in this company was sold on the 15th instant to a party of Boston capitalists represented by Mr. John J. Shipherd, of the firm of Jacob R. Shipherd & Co., of No. 24 Pine street, New York, who are selling the company's new bonds. A new directory was to be elected this week.

Chesapeake & Ohio.

The tunnel now being constructed for this road through Church Hill, Richmond, Va., caved in for about 100 feet, January 14. It is feared that this will cause serious delay in the completion of the tunnel.

Northern Pacific—Pacific Division.

Several heavy land-slides on the line of this road stopped travel for some two weeks. Near Pumphrey's the track was buried for nearly two miles, and in some places moved forty feet from the road bed.

Virginia & Truckee.

A heavy land-slide near Washoe blocked up the track of this road for nearly a mile, December 26, and several day's labor was required to clear the road.

Orange, Alexandria & Manassas.

By the agreement of consolidation between this company and the Lynchburg & Danville, the name of the new company was to be the Virginia & North Carolina. It is thought that this name is not sufficiently descriptive, and a bill has accordingly been introduced in the Virginia Legislature, authorizing the company to take the name of the Washington City, Alexandria, Lynchburg & North Carolina Railroad Company. The bill also authorizes the company to issue bonds under its new name to retire all outstanding obligations of the Orange, Alexandria & Manassas and Lynchburg & Danville companies.

The grading on the road from Lynchburg to Danville is almost all done, and tracklaying will begin early in the season. The length of the line is 66½ miles.

Houston & Texas Central.

The road is completed to Van Alstyne, 102 miles from Corsicana and 17 miles beyond McKinney, the late terminus.

Dakota Southern.

The stations and distances from Vermillion, the late terminus, to Yankton are: Lincoln, 7½ miles; Gayville, 13½; Yankton, 25. The whole length of the road from Sioux City, Iowa, to Yankton, Dak., is 61 miles.

Owosso & Northwestern.

The road-bed is graded from Owosso, Mich., to Alma, in Gratiot County, 40 miles. The line is under contract to be completed to Evert, Osceola County, 45 miles further, in 1873. The terminus will be at Frankfort, on Lake Michigan, about 160 miles from Owosso.

Toledo, Wabash & Western.

At a meeting of the directors in New York on the 20th, a new issue of $5,000,000 of 7 per cent. gold bonds, to run for 30 years, was authorized, the proceeds to be used for renewing the track with steel and for additional equipment, a work which will probably extend over two or three years.

Montpelier & Wells River.

Three miles of track has been laid on the Montpelier end of the road, and the grading is completed to Newbury, on the Connecticut and Passumpsic Rivers road, 38½ miles east of Montpelier.

Missouri, Kansas & Texas.

The grading on the extension from Sedalia, Mo., northeast to Moberly, 72 miles, is all finished. The iron has been all purchased and a part of it is on the ground, so that tracklaying will probably be commenced in the spring. At Moberly connection will be made with the St. Louis, Kansas City & Northern and the Hannibal & Moberly Division of the Toledo, Wabash & Western road.

Keokuk & Kansas City.

A correspondent informs us that this company (formerly known as the Misouri & Mississippi) has now about 50 miles of its road graded and ready for the iron. The Western Construction Company, which is building the road, is making vigorous efforts to complete it from Keokuk, Iowa, to Glasgow, Mo., 125 miles, this season. At Glasgow, the company purpose to bridge the Missouri.

New Orleans, Baton Rouge & Vicksburg.

A correspondent writes to us that this company has sold a portion of its bonds in Europe, and that work will begin this month. It is expected that the line from Shreveport, southeast to Alexandria, 124 miles, will be completed this year. The officers of the company are: Levi Parsons, President; G. W. Cochrane, Vice-President and General Superintendent; C. E. Allen, Chief Engineer.

New York & Oswego Midland.

A number of the employees of the road at and near Middletown, N. Y., have struck, giving as a reason that they have had no pay since September last. The train-men have not yet struck, though efforts have been made to induce them to do so.

Lancaster & Reading.

At a recent meeting the board of directors formally adopted the location of the Quarryville Branch, as made by the engineers, about which there has been much dispute.

Cazenovia & Canastota.

This road was sold under foreclosure of mortgage, January 8, and was bid in by Mr. Clark, of New York, agent of the bondholders, for about $280,000, the amount of the mortgage and interest. The road extends from Canastota on the New York Central, south to Cazenovia, 15 miles.

Pay for Carrying Mails.

Postmaster-General Creswell has explained to the House Committee on Appropriations his scheme for the readjustment of payments to railroad companies for postal service. The effect in all cases is to increase the pay, authority for which is found in the section of postal code allowing the addition of fifty per cent. to the compensation of companies, and for which the Postmaster-General asks an appropriation of half a million of dollars, though upon the basis on which the readjustment is proposed the aggregate increase of all the routes would be $722,100. The scale of prices submitted by the Postmaster-General begins with a minimum of fifty dollars per mile per annum on routes carrying over their whole length an average weight of two hundred pounds of mail matter per day, and increases gradually to two hundred dollars per annum for each five thousand pounds per day, with twenty-five dollars additional for each two thousand pounds and twenty-five dollars per year for every line of railway postal cars. A letter was also submitted from the Assistant Superintendent of the Railway Postal Service, announcing the intention of the Department to add as soon as possible a service daily between Cincinnati and Chicago by the Kankakee route, from Columbus to Indianapolis, from Parkersburg to Cincinnati, and from Cincinnati to St. Louis, each one daily, and generally to increase the service on all important routes in the West. Under the new schedule the Boston & Albany Railroad would receive on the route between Boston and Springfield $525 per mile, or $21,000 annually, an increase of $6,000; the Boston & Fitchburg, $200 per mile, or $5,900 increase annually; and the Connecticut River, from Springfield to South Vernon, Vt., $4,625 annually.

Southern Minnesota.

The employees on this road have virtually taken possession of the line and stopped the running of trains. They claim that six months' pay is due them and that they are suffering badly from the delay in payment. The road was lately put into the hands of a receiver.

Indianapolis, Bloomington & Western.

This company has purchased 20 new 32-ton locomotives, some of which have already been delivered.

Delaware & Hudson Canal.

This company has purchased the old Western Hotel property in Courtlandt street, New York, and intends to erect a large and commodious brick building for its general offices.

Terre Haute & Indianapolis.

Mr. Chauncey Rose, the heaviest stockholder in this company, has sold out his interest in the road to D. W. McKeen and others, of Terre Haute, Ind., and has retired from the management of the road.

Warren & Venango.

The difficulty with the Oil Creek & Allegheny River Company about the crossing of the two roads at Titusville has been arranged, and the company has commenced laying its track into that city.

St. Louis & Iron Mountain.

A conference has been held between Mr. Allen, President of this company and Mr. Walker, Vice-President of the Mobile & Ohio, and such arrangements have been made for exchange of cars as will prevent any blockade of freight at Belmont. It was also agreed that steps should be taken towards building a bridge over the Mississippi at Belmont.

Portland & Oxford Central.

It is reported that this railroad has been purchased by the Maine Central Company. The road extends from Mechanic Falls on the Grand Trunk road, 36 miles from Portland, north to Canton, 27 miles. It has no direct connection with the Maine Central.

Bath & Portland.

The railroad committee of the Maine Legislature has reported favorably a bill to charter this company. The bill authorizes the company to issue bonds to the amount of $2,000,000, and requires that the road shall be located by January 1, 1876, and completed by January 1, 1881. The line would be about 35 miles long, and would be parallel and close to the Maine Central.

New York & Philadelphia.

A bill has been introduced in the New Jersey Legislature to charter the New York & Philadelphia Railroad Company, with authority to construct a railroad from Jersey City through Boundbrook to Trenton, with a branch from some point within five miles of Trenton to and across the Delaware River, to connect with any railroad in Pennsylvania. The bill also gives the company authority to purchase the Yardleyville Bridge over the Delaware, or to build a bridge across that river. The road is to be double track, and is not to cross any other railroad or highway road at grade. The company is to be authorized to acquire the title to other railroads built, being built, or authorized to be built in the State, with the consent of the parties in interest. The capital stock is to be $7,500,000, in shares of $100, and whenever 10,000 shares shall be subscribed the corporators shall call a meeting of the stockholders to organize the company by the election of 15 directors. The corporators named are as follows: George Richards, Cortlandt Parker, Henry Lewis, John R. Cecil, Henry D. Van Nostrand, George A. Allen, Samuel C. Forker, Algernon C. Cadwallader, Alexander P. Berthoud, Jacob Reigel, Gustavus N. Abeel, Alfred S. Livingston, William Walter Phelps, Robert B. Cabeen, Sidney Cooper, James W. Thompson, John P. Veree, William R. McIlvaine, Robert R. Corson, James H. Sullivan, Samuel K. Wilson, John Hulme, Abraham J. Skillman, Abraham S. Hewitt, James Stewart, Jr., Thomas Seymour Adee, William A. Newell, Amos Clark, Jr., Charles K. Landis, Ami B. Clark, Thomas L. Mott, William G. Thomas, Henry Carpenter, John Woolverton and Abraham Browning.

This is evidently identical, or nearly so, with the National Railway project. The list of corporators includes with the names of some of the best men in the State those of the leading men in the National Company. The route indicated is that of the National road, and the provisions of the bill point to the purchase of the Stanhope and other charters. It is needless to add that the bill will meet with determined and bitter opposition and will not pass without a hard struggle, and though the present Legislature of New Jersey contains many avowed opponents of railroad monopoly and of the Pennsylvania Railroad Company, it is impossible to say what the chances of the bill really are.

Penobscot Bay & River.

This company has asked the Maine Legislature for an extension of time in which to complete the survey and location of the road.

Union Depot at Portland, Me.

A company is to be organized to build a new Union Depot at Portland, on the grounds owned by the Boston & Maine Company. The presidents of all the companies interested are the corporators.

International & Great Northern.

A telegram, dated January 14, announces that the company is ready to receive freight for Kilgore, on the International road, 12 miles southeast of Longview.

Smith County, Texas, has voted $250,000 to the Great Northern, and the town of Tyler $50,000 additional.

The bridge across Buffalo Bayou, near Houston, Tex., has been completed, establishing connection with the Galveston, Houston & Henderson road at Allen Station. This will very much expedite the transfer of freight to or from Galveston.

Cairo & Fulton.

Passenger trains are running regularly from Little Rock to White River, but construction trains only have so far been run north of White River. The iron bridge over that stream will be completed early in February, and passenger trains will then be put on from Little Rock to St. Louis.

Shenandoah Valley.

This company has executed a first mortgage on their road for $3,750,000. J. Edgar Thomson is trustee under the mortgage.

Rio Grande.

The track on this road, from Point Isabel, Tex., to Brownsville, is laid to a point 20 miles from Point Isabel, and within ten miles of Brownsville. This is an extension of fourteen miles since our last accounts.

Texas & Pacific.

The surveying parties in Western Texas have nearly reached El Paso. Much time was spent in the Guadaloupe Mountains, and a new pass has been found ten miles south of that formerly surveyed, which will give a line with low grades and will besides avoid the heavy work in the Sierra Hueco.

Mercer & Somerset.

This road is nearly completed to Millstone, N. J., 17 miles beyond Pennington, the late terminus, and trains will probably begin running from Trenton to New Brunswick by this route early in the spring.

On the Strength and Proportions of Riveted Joints, With the Results of Some Recent Experiments.

By Mr. Walter R. Browne, of Bristol.

DISCUSSION.

Mr. J. G. Wright said that, since the reading of the paper at the last meeting, some experiments had been made by his firm, to test the relative strength of the diagonal joint employed for steam boilers, as shown in Fig. 21, in comparison with the ordinary longitudinal joints. Two plates were tested with the diagonal joint at 45 deg., as shown in Fig. 24, and two with the longitudinal joint, as in Fig. 25; they were of Staffordshire iron of "Monmoor Best" brand, 3 feet 6 inches long, 12 inches wide across the part tested, and ¾ inch thick; the joint was a single riveted lap-joint with punched holes, the rivets being 13-16ths inch diameter and 2 inch pitch, and the width of lap 2¼ inches. Test pieces cut from the plates, as in Fig. 26, were also tested, to ascertain the tensile strength of the solid plates both lengthways and crossways of the grain. The experiments were conducted by Mr. Kirkaldy, and the following were the results, the plates themselves being exhibited to the meeting. The plates in each instance tore through the rivet holes along the line of the joint, and the average strength of the straight joint was 48.2 per cent. of that of the solid plate, while the average

strength of the diagonal joint was 64.7 per cent. of that of the solid plate. These results were the mean of two experiments on each description of joint, and the increase of strength by the adoption of the diagonal joint was therefore 34 per cent., or in the proportion of three to four. The following table gives the particulars of the several trials:

Experiments on relative strength of Diagonal and Longitudinal Joints.

Description of Joint.	Size of Plates.	Total Breaking Strain.	Resistance per square inch. Joint.	Resistance per square inch. Solid Plate.	Proportionate Strength of Joint to Solid Plate....	
	Inches.	Tons.	Tons.	Tons	Per Cent.	
Diagonal at 45°	12.00 × 0.38	57.85	12.69	19.66	66.6	Mean 64.7
do.	12.00 × 0.38	58.21	12.77	20.32	62.8	
Longitudinal ..	11.90 × 0.38	41.45	9.17	19.90	46.1	Mean 48.2
do.	12.00 × 0.38	44.54	9.77	19.37	50.4	

Mr. J. ROBINSON inquired whether the proportions of the dimensions employed in the joints of the experimental plates now exhibited were the same as those given in the table accompanying the paper read at the last meeting. He asked also whether much difference had been found in the tensile strength of the test pieces now shown, according as the strain had been applied lengthways or across the grain of the iron; in some Yorkshire plates there was scarcely any difference in strength, in whichever direction they were tested.

Mr. J. G. WRIGHT replied that the dimensions of the joints in his experiments did not quite agree with the proportions given in the table, the pitch being somewhat less than three times the diameter of rivet, as seen in the plates exhibited, and the diameter rather more than twice the thickness of the plate. The joints in these experimental plates were made exactly according to the proportions that were regularly followed in boilers constructed at his works. The difference of strength in the test pieces cut from the plates, according as they were tried longitudinally or crossways of the grain, was considerable; the average tensile strength of eight pieces tried longitudinally was 19.7 tons per square inch, while the average of four pieces tried crossways was only 16.8 tons, or nearly 15 per cent. less. In preparing the experimental plates for testing the joints, care had been taken that the direction in which they had been rolled should be one in which the strain would be thrown upon them in testing.

Mr. J. Cochrane observed that the question of the comparative extent to which the strength of riveted iron structures was affected by the punching or the drilling of the rivet holes had occupied his attention; and he had made a number of experiments upon it in connection with Mr. Berkeley's investigation of the construction of suspension-bridge links, to which reference had been made in the paper read at the previous meeting. The object in view had been to find out for ordinary bridge-building work, not boiler work, whether in regard to strength there was really much advantage in drilling over punching: not considering whether a number of plates to be riveted together would make better work when punched or when drilled, but simply taking account of the relative strength of the individual plates or bars in a case where the punching was done with as much care as would be bestowed upon drilling. The experiments were made with bars of Low Moor and Staffordshire iron, 3 feet long, planed down to a uniform thickness and shaped to a uniform width, as shown in fig. 27. The Low Moor bars were soft and fibrous, and the Staffordshire were hard and crystalline. Three experiments were tried with each description of iron, in the first of which a hole of rather less than one inch diameter was drilled in the middle of the bar; in the second the hole was punched ¼ inch too small in diameter and then rimered out to the full size; and in the third the hole was simply punched large enough to take a rivet of the same size as would be used for the two other holes. The three bars of Low Moor iron were all out of the same piece of metal, so that as far as possible the quality of the iron was uniform in them; and the result was seen to be that the drilled and punched bars were practically the same in strength, the Low Moor drilled bar being about 1 per cent. stronger than the punched bar of the same iron, and the Staffordshire drilled bar 2·3 per cent. weaker than the punched bar. The following were the particulars of the trials:

Experiments on Bar Iron with Punched and Drilled Holes.

No. of Experiment.....	Description of Iron.	Description of Hole.	See Fig. 27. Thickness at AB..	Width at AB.....	Diameter of Hole.	Sectional Area at AB.....	Total Breaking Strain.....	Resistance per Square Inch...
			In.	In.	In.	Sq.In.	Tons.	Tons.
1	Low Moor ...	Drilled	0·49	1·89	0·92	0·435	11·75	24·72
2	" " ...	Punched and rimered... ..	0·49	1·90	0·92	0·480	12·25	25·51
3	" " ...	Punched.....	0·49	1·91	0·97	0·461	11·30	24 52
4	Staffordshire.	Drilled.....	0·5	2·00	0·92	0·540	12·50	23·15
5	" "	Punched and rimered	0·50	2·00	0 92	0·540	12·50	23·15
6	" "	Punched... ...	0 50	2·00	0·97	0·515	12·20	23·69

He had also tried a series of similar experiments with Staffordshire plate iron, tested both lengthways and crossways of the grain, as shown in fig. 28, with the following results.

Experiments on Plate Iron with Punched and Drilled Holes.

No. of Experiment.....	Description of Iron.	Description of Hole.	See Fig. 28. Thickness at AB..	Width at AB.....	Diameter of Hole.	Sectional Area at AB.....	Total Breaking Strain.....	Resistance per Square Inch..
			In.	In.	In.	Sq.In.	Tons.	Tons.
7	Lengthways..	Drilled.....	0·50	2·03	0·92	0·355	11·85	21·35
8	" " ..	Punched and rimered	0·50	2·02	0·92	0·350	11·90	21 64
9	" " ..	Punched... ...	0·50	2·03	0·97	0·333	11·5	21·58
10	Crossways ...	Drilled.....	0·52	1·98	0·92	0·351	10·00	18·15
11	" " ...	Punched and rimered.....	0·52	1·98	0·92	0·351	10·00	18·15
12	" " ...	Punched.....	0·52	2·00	0·97	0·335	10·00	18·69

The drilling was here seen to have no advantage over the punching as affecting the strength of the plates; and the mean of the two sets of results showed that the plates were about 15 per cent. weaker when tested crossways than when tried longinally of the grain.

Having been considerably engaged in the manufacture of bridge work at the time of making these experiments, at the Woodside Iron Works, Dudley, it had been satisfactory to him

RIVETED JOINTS.

Experiments on Strength of Diagonal and Straight Joints.

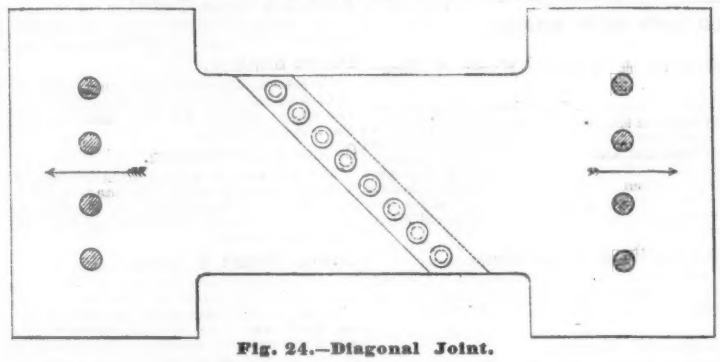

Fig. 24.—Diagonal Joint.

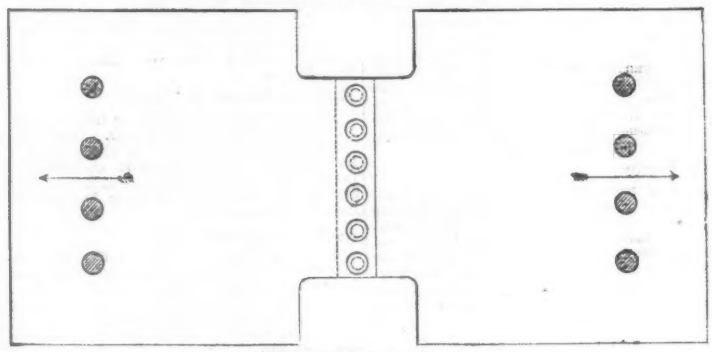

Fig. 25.—Straight Joint.

Fig. 26.—Test Piece.

Experiments on Strength of Drilled and Punched Bars and Plates.

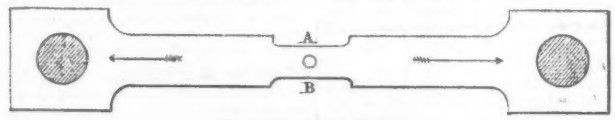

Fig. 27.—Bar Iron.

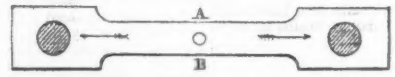

Fig. 28.—Plate Iron.

to arrive thus at the conclusion that punching when well done left the iron practically as strong as drilling or otherwise forming the rivet holes, and was thus equally suitable for single-riveted lap-joints. But where, as frequently occurred in large girders, a number of plates, say five or six, had to be riveted together, one over another, in order to make up a sufficient thickness of metal, the case was totally different; the advantage of drilling over punching was then very great, where it was well done, as it insured the exact correspondence of all the holes. Unless, however, the position of the drilled holes were set out with perfect accuracy, so as to make them coincide correctly, it would be impossible to fill the holes properly with the rivets, on account of square shoulders being formed by the edges of the holes not coinciding, which would have the effect of nicking the rivets in those places; in such a case he believed drilled work would be decidedly worse than good punched work.

Mr. J. ROBINSON observed that, after so much had been said, for many years about the great superiority of drilled holes for boiler work, and the serious extent to which the plates were deteriorated by punched holes, it was very reassuring to find from the experiments just described that punched plates were not really inferior in strength to drilled plates, and it appeared, indeed, that in three instances in those experiments punching had even shown a slight advantage in strength. This was a remarkable result, which he certainly was not prepared for; and he inquired whether it had been obtained without annealing the perimental plates after punching.

Mr. J. COCHRANE replied that the specimens in his experiments had been tested without being annealed after punching.

Mr. J. ROBINSON mentioned that in the case of steel boiler plates he had been informed that if the plates were annealed after punching, the strength of the metal was restored almost to what it had been before the punching operation. There appeared, indeed, to be a considerable discrepancy between the percentages of strength given in the table of proportions accompanying the paper, and the results of Mr. Cochrane's experiments, the percentages of strength in the paper being in every instance materially lower for punched holes than for drilled holes. He should be glad, therefore, to hear some explanation of the difference in the results in respect to this highly important matter. In Mr. Wright's experiments one point that struck him as requiring notice was that the strength of the straight joint had been found to be only 48 per cent. of that of the plates, which were of Staffordshire iron. This result was considerably lower than the strength assigned by the table in the paper to a single-riveted lap-joint, which amounted to 55 per cent. with punched holes and 62 per cent. with drilling. In the diagonal joint the experiments showed that the strength was brought up to 64 per cent of that of the plates; but judging from the figures given in the table in the paper it seemed to him that, instead of attempting to increase the strength of joint by the diagonal plan with the ordinary lap-joint, it would be preferable, in order to make the best use of the material, that the joints should be butt-joints and double-riveted, thereby raising the strength to 72 or 79 per cent. of that of the plates.

As the longitudinal joints in steam boilers were the weakest part, he hoped some means would ultimately be devised of rolling weldless cylinders of the full diameter of a boiler, so as to require only transverse circular joints, and dispense with the longitudinal joints altogether. Wheel tires had for some years past been rolled solid without any joint whatever, and more recently gun-hoops of considerable length had been hammered or rolled without a weld; and from these operations, now successfully accomplished, it did not seem to him any very great step further to go on to the manufacture of weldless rings or cylinders of boiler plate. By that means the deterioration of strength consequent upon the drilling or punching of rivet holes for the longitudinal riveted joints would all be got rid of, and a boiler would be obtained of the full strength of the solid plate. Such a mode of construction was a great desideratum at the present time, and he hoped it might be realized in practice before long. One result of superseding the longitudinal joints would be that thinner plates might be used; and in an instance that had recently come under his observation of a steel boiler ring of only 3 feet diameter, suitable for working at high pressure, the plate itself would have been amply strong enough if only ¼ inch thick, but had been rolled or hammered ½ inch thick because of the difficulty of keeping up the heat until the plate was made thinner. In reference to the use of thickened-edge plates, to which allusion had been made in the paper as a means of bringing up the strength of the joint to that of the solid plate, there was no doubt that the weakness attending all ordinary joints could be obviated by that mode of construction; and this plan having been originally adopted on the Midland Railway for locomotive boilers, he inquired whether it was still adhered to for the purpose.

Mr. W. KIRTLEY replied that the thickened-edge plates continued to be used for the locomotive boilers on the Midland Railway; but the principal object in their adoption had been to do away with the angle-iron joint at the smoke-box end, by getting metal enough in the plate itself at that part to allow of flanging it over for riveting to the smoke-box; and on this account the thickened edges occurred only at the transverse circular joints of the boiler, and were not employed for the longitudinal joints as proposed in the paper; the longitudinal joints were welded, which gave greater strength than any double-riveted joints.

The PRESIDENT remarked that, if the thickened edges were arranged for the longitudinal joints, the direction of rolling of the plates would then be parallel to the length of the boiler, and when put together therefore the severest strain would come upon them crossways of the grain, which he thought would be a serious objection to that mode of construction.

Mr. J. H. PERKS thought that in the experiments on the diagonal joint the strength of the joint would be increased in proportion to the greater number of rivets it contained as compared with the straight joint; and if the number of rivets in the diagonal joint were one-third more than in the straight joint, that would be sufficient to account for the increase of 34 per cent. in the strength. It appeared to him, therefore, that in order to make the comparison complete, the total number of rivets in the diagonal joint should have been kept the same as in the straight joint.

Mr. J. G. WRIGHT remarked that, if the actual number of rivets had been the same in the diagonal as in the straight joint, they would have had to be spaced wider apart in the diagonal, by which the proportions of the joint would have been altered; but the object of the experiment had been to test the very same joint when straight and when placed diagonally, so as to ascertain the true effect of the diagonal position. For this purpose the transverse sectional area of the plates, at right angles to the line of strain, had been made the same in the two sets of plates tested, and all the dimensions of the joints had been kept identical.

[TO BE CONTINUED.]